PRELIMINARY ASSESSMENT

of

HOUSTON LIGHTING AND POWER W. A. PARISH GENERATING STATION

(TXD097311849)

Prepared By:

Carol Cox, FIT Environmental Scientist

ICF Technology, Inc.
Region VI

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PRELIMINARY ASSESSMENT

of

HOUSTON LIGHTING AND POWER W. A. PARISH GENERATING STATION

TABLE OF CONTENTS

FIGURES

ATTACHMENTS

ATTACHMENT	TITLE
A	SOLID WASTE MANAGEMENT UNIT LIST

1. SITE INFORMATION

The Region VI Field Investigation Team (FIT) was tasked by the U.S. Environmental Protection Agency (EPA) under Technical Directive Document (TDD) F-06-8908-32 to conduct the Preliminary Assessment (PA) of the Houston Lighting and Power W. A. Parish Generating Station (TXD097311849) in Thompsons, Fort Bend County, Texas.

1.1 SITE LOCATION

The Houston Lighting and Power W. A. Parish Generating Station is located at 2759 Jones Road, Thompsons, Texas 77481, 3 miles southwest of the Town of Thompsons. The mailing address is P. O. Box 1700, Houston, Texas 77001. Site coordinates are 29°29'15" north latitude and 95°38'0" west longitude. The facility encompasses approximately 3,000 acres (Figure 1).

1.2 SITE BACKGROUND

The privately owned Houston Lighting and Power Company had an estimated revenue of $3 billion for fiscal year 1989 (Ref. 26).

2. BACKGROUND AND OPERATING HISTORY

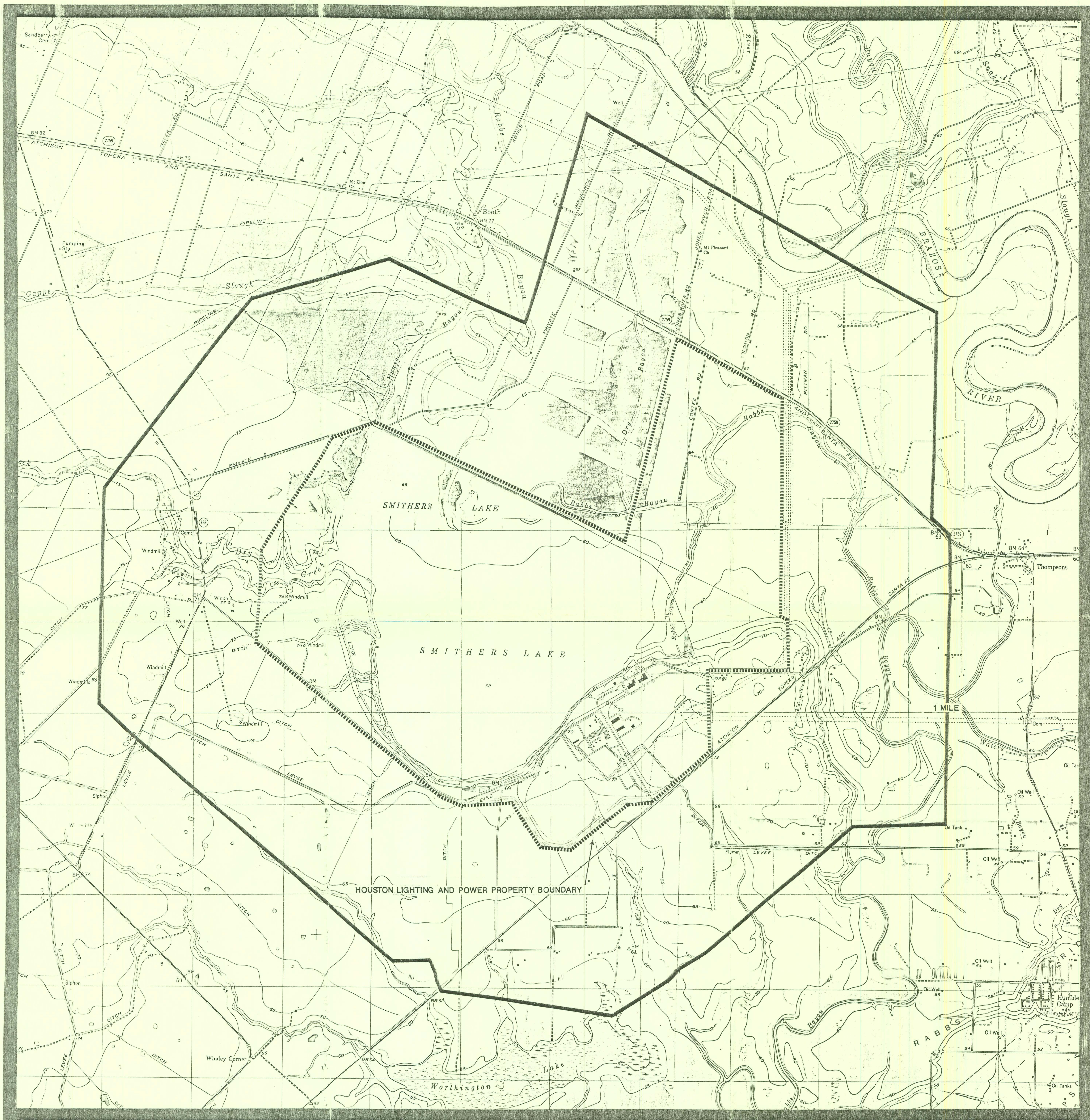
This section addresses site history and operations, known and potential problems, and regulatory involvement of federal, state or local agencies.

2.1 SITE HISTORY

The W. A. Parish Generating Station began operating June 1, 1958 with gas-fired turbine units (Ref. 27, p. 1). Coal-fired units 5 and 6 were constructed between 1974 and 1978 (Figure 2). Operations began in late 1978 (Ref. 6, p. 3). Coal-fired units 7 and 8 came on-line in 1980 and 1982 respectively (Figure 3) (Ref. 9, p. 9; Ref. 11, p. 1). The plant produces electricity by generating steam from gas-operated and coal-fired turbines. Process water is routed through chemical treatment systems to remove suspended solids and adjust pH. Treated wastewater is discharged into Smithers Lake, Rabbs Bayou or Dry Creek. Sludges remaining on the floors of surface impoundments are periodically removed and sent through a rotary vacuum to remove moisture. Dried sludge is stored in the lagoon area. Bottom ash and fly ash are stored in the lagoon prior to being sold for recovery. Flue gas desulfurization sludge is dewatered and stored in the lagoon. Oil and oil sludge generated on-site is drummed and stored for off-site disposal. PCB and mercury contaminated solids and PCB capacitator fluids are drummed for off-site disposal. Lead contaminated blasting material is stored in bins prior to disposal off-site (Ref. 5, pp. 5-6; Ref. 6, pp. 1-4; Ref. 9, p. 5).

2.2 KNOWN AND POTENTIAL PROBLEMS

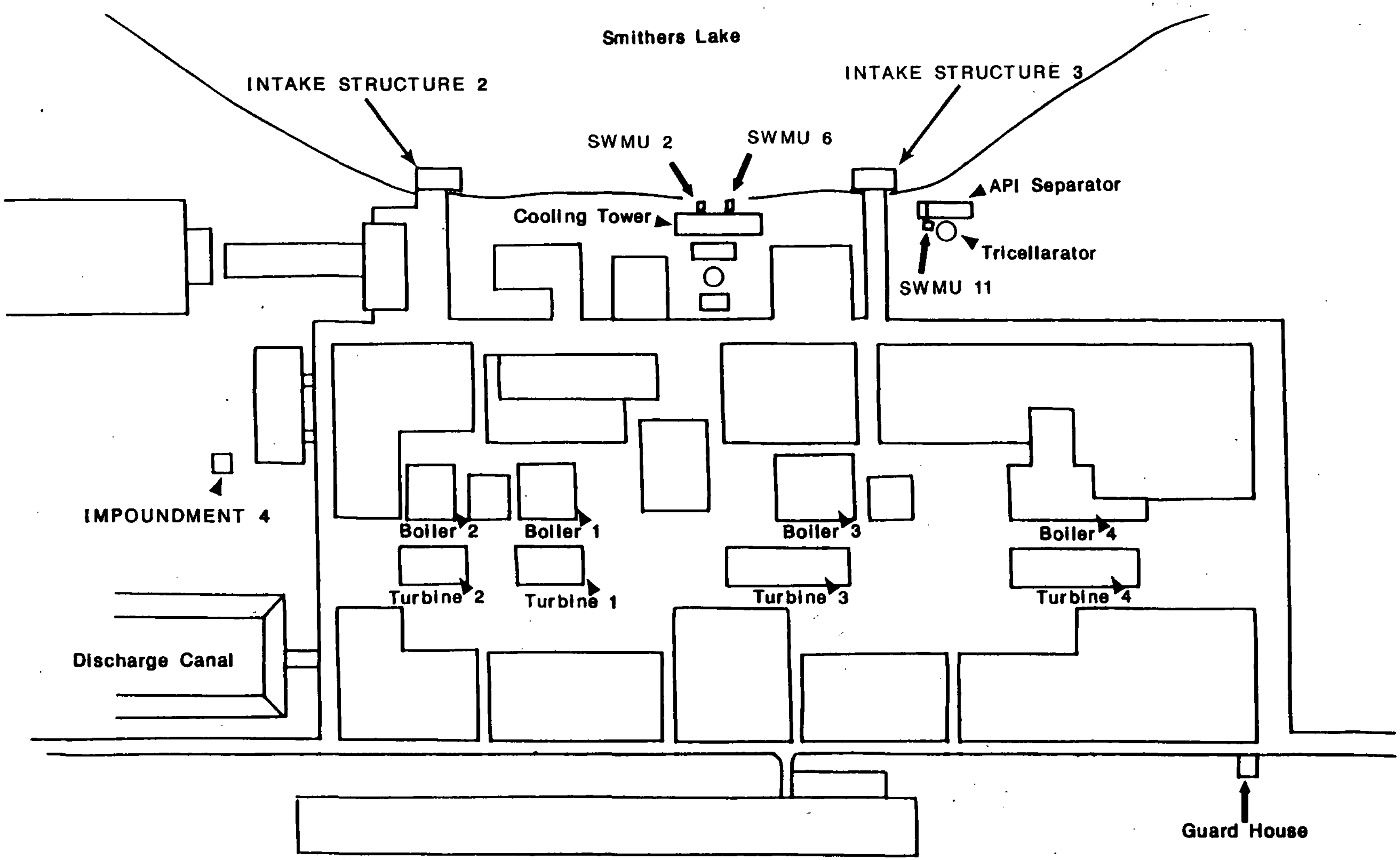
Contaminants of concern were found in a Texas Water Commission (TWC) Notice of Solid Waste Management Registration and laboratory data from samples collected by Houston Lighting and Power on March 11, 1983 for Extraction Procedure Toxicity (EP Toxicity) tests. The samples were analyzed by Southern Petroleum



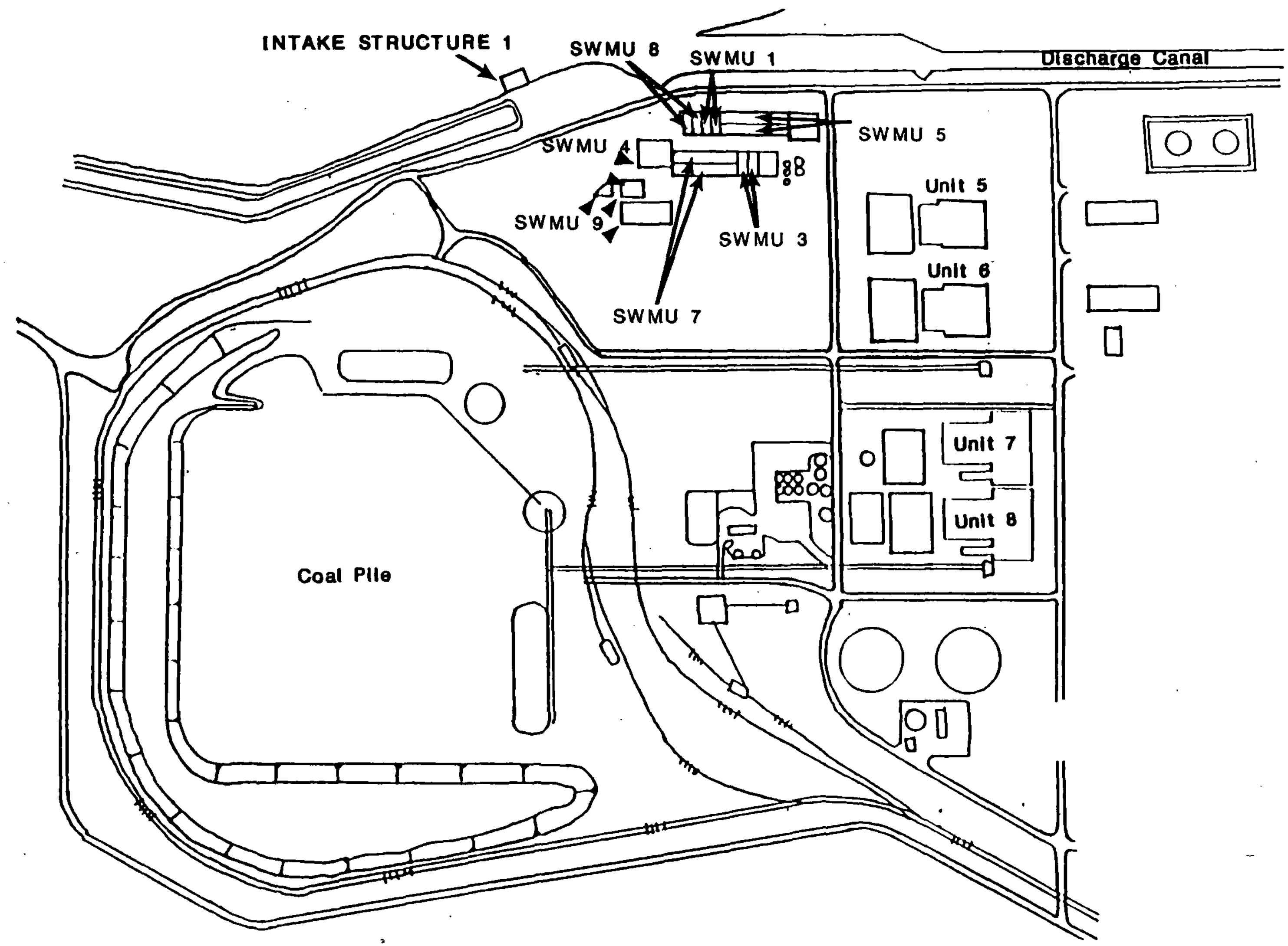
Site Location Map
W. A. PARISH GENERATING STATION
Thompsons, TX
TDD NO. F-6-8908-32
CERCLIS NO. TXD097311849
FIGURE 1

N
0 2000FT
SCALE 1 : 24000

TEXAS
QUADRANGLE LOCATION
MISSOURI CITY, TX
SMITHERS LAKE, TX
SUGAR LAND, TX
THOMPSONS, TX



Site Sketch of Units 1-4
W. A. PARISH GENERATING STATION
THOMPSONS, TX
TDD NO. F-6-8908-632
CERCLIS NO. TXD097311849
FIGURE 2



Site Sketch of Units 5-8
W. A. PARISH GENERATING STATION
THOMPSONS, TX
TDD NO. F-6-8908-632
CERCLIS NO. TXD097311849
FIGURE 3

NOT TO SCALE

N

Laboratories in accordance with the extraction procedures outlined by the EPA in Part 261, Appendix II of the Hazardous Waste Regulations (Ref. 6, p. 13). Analysis of demineralizer regenerant wastewater, metal cleaning inorganic acids (wastewater and sludge) and metal cleaning organic acids revealed arsenic, barium, cadmium, chromium, endrin, lead, lindane, selenium and toxaphene in trace amounts (Ref. 6, pp. 18-31). The TWC registration form listed acetone, asbestos, mercury and PCB contaminated solids and fluids as having been stored on-site (Ref. 5).

The Houston Lighting and Power analytical data concerns the classification of waste. EP toxicity data from the wastewaters and sludges resulted in declassification to Class II waste on April 8, 1981 (Ref. 6, pp. 2-3).

CERCLA, TWC and NPDES files were searched for available information. An off-site reconnaissance inspection was not performed.

A Closure Plan was approved by the TWC on September 23, 1985 for the Outdoor Container Storage Area. A December 1988 Closure Review by A. T. Kearney, Inc. determined that the closure did not meet the closure performance standard of 40 CFR 265.111. The Closure Plan and Certification of Closure did not demonstrate how closure activities controlled, minimized or eliminated post-closure escape of hazardous waste. The container storage area managed 55-gallon drums of hazardous wastes, including spent solvents and paint thinners (Ref. 6, p. 11; Ref. 15, pp. 2, 4).

2.3 REGULATORY INVOLVEMENT

The facility applied to the EPA for a hazardous waste permit on November 19, 1980 (Ref. 27, p. 1). The NPDES permit number is TX0006394. The TWC Registration number is 01038 (Ref. 19, p. 1). The generating station is registered with the Texas Department of Water Resources (TDWR) under Solid Waste Registration number 31631 (Ref. 6, p. 16).

3. WASTE CONTAINMENT AND HAZARDOUS SUBSTANCE IDENTIFICATION

Waste generation and containment are addressed in this section.

3.1 DOCUMENTATION

Process water is pumped to fiberglass-lined concrete settling basins for treatment in the chemical waste treatment systems. The systems consist of the settling basins, solids contact clarifier for suspended solids removal and primary and secondary pH adjustment. Treated wastewater is discharged via an NPDES permit. Accumulated sludge is sent through a sludge dewatering system prior to storage in the lagoon (Ref. 6, pp. 1-4; Ref. 9, pp. 2-11). Between February 2 and April 17, 1989, 24,560 gallons of untreated wastewater were discharged into Smithers Lake (Ref. 19). Violations such as these have been attributed to mechanical breakdowns (Ref. 24, p. 2). Other substances such as waste oils, spent solvents, lead contaminated sandblasting material, asbestos insulation and paint thinner are generated on-site (Ref. 6, pp. 1-4; Ref. 5). These materials are stored in Container Storage Area 2 prior to off-site disposal (Ref. 5, pp. 5-6; Ref. 9, p. 5).

3.2 WASTE GENERATION

Wastes generated on-site are addressed in the attached Solid Waste Management Unit List (Attachment A) per EPA request.

3.3 CONTAINMENT

Waste containment is addressed in the attached Solid Waste Management Unit List (Attachment A) per EPA request.

4. PATHWAY CHARACTERISTICS

This section characterizes environmental pathways and evaluates the potential of contaminant migration from the facility.

4.1 GROUND WATER

The W. A. Parish Generating Station is located in the western Gulf Coastal Plain Geologic Region on the Beaumont Formation and the alluvium of the Brazos River. The Beaumont Formation is principally a poorly bedded, calcareous clay containing thin discontinuous stringers and lenses of silt, sand and fine sand (Ref. 14, pp. 3-5).

The Beaumont Formation is part of a larger stratigraphic unit known as the Chicot Formation, which provides water for domestic use, livestock watering (Ref. 18) and industrial use (Ref. 14, p. 6). The thickness of the aquifer increases toward the Gulf of Mexico from zero at the western edge of the Quaternary outcrop (80 miles from the Gulf) to more than 1,200 feet at the Gulf (Ref. 14, p. 6). The Evangeline Aquifer immediately underlies the Chicot Aquifer and is an important source of ground water in the Houston Metropolitan area. The aquifer thickness is greater, up to 2,000 feet near the Gulf. Both major aquifers indicate regional water flow toward the Gulf (Ref. 14, pp. 3-7).

Measurement to depth of ground water in the boreholes drilled during a geotechnical investigation of the ash storage area by McClelland Engineers, Inc. suggests the water level is 8 to 10 feet below the ground surface (Ref. 12, p. 2). Nearby residential wells are screened in the Chicot Aquifer (Ref. 7). W. A. Parish wells 306 and 307 penetrate the Chicot Aquifer. W. A. Parish wells 302, 303, 204 and 313 draw from the Evangeline Aquifer (Ref. 16, pp. 2-6). Water level measurements for wells 302, 303 and 304 indicate a decrease in static water level between 1980 and 1984 (Ref. 28, p. 44; Ref. 16, p. 44). Ground water is not being monitored at the plant because the waste is classified as Class II waste (Ref. 10, p. 18).

The Thompsons area receives an estimated annual net precipitation of 46 inches (Ref. 32).

4.2 SURFACE WATER

The local topography is relatively flat, with Smithers Lake at the highest elevation. Natural drainage flows from Smithers Lake to lower elevations through Dry Creek, Rabbs Bayou and unnamed tributaries (Ref. 2). Smithers Lake is privately owned by the power plant. No information is available regarding the dam along the northern boundary of the lake. Flood maps indicate a continued interaction between Smithers Lake and the northern section of Rabbs Bayou (Ref. 20). Rabbs Bayou dissects the lagoon area, which also contains undrained depressions (Ref. 12, p. 4). Storage areas within the lagoon are not diked or bermed and are non-compliant with Chapter 3 (Surface Water Non-Point Source Discharge) and Chapter 8 (Floodplains) of the Open Dump Inventory Criteria (Ref. 10, pp. 2, 10).

NPDES Outfalls from the plant discharge into the following:

Outfall 001:	Dry Creek, to Rabbs Bayou to the Brazos River in Segment 1202 of the Brazos River Basin
Outfall 002:	Smithers Lake or Dry Creek
Outfall 003:	Smithers Lake
Outfall 004:	Smithers Lake
Outfall 005:	Smithers Lake
Outfall 006:	Smithers Lake (Ref. 29, p. 1)

Smithers Lake has three water intakes located near the power plant (Figures 2 and 3). No other intakes are located along the Smithers Lake, Rabbs Bayou or Dry Creek (Ref. 18; Ref. 22). Smithers Lake is infrequently fished from bridges (Ref. 18). Rabbs Bayou and an unnamed tributary feed Worthington Lake. A Bald Eagle (*Haliaeetus leucocephalus*) rookery is located approximately five miles downstream (Ref. 2; Ref. 8). Other endangered species inhabiting Fort Bend County include the Piping Plover (*Charadrius melodus*), Whooping Crane (*Grus americana*), American Alligator (*Alligator mississippiensis*) and Least Interior Tern (*Sterna antillarum*) (Ref. 31).

Rabbs Bayou is a minimum perennial stream, having an average flow of less than 10 cubic feet per second (Ref. 1, p. 139; Ref. 2). Gaging station information from Dry Creek is unavailable. Average flow for the Brazos River at Richmond, Texas (1941-1987), approximately 15 miles upstream of the site, is 7,209 cubic feet per second (Ref. 30, p. 3). The 2 year, 24 hour rainfall for the area is estimated at 4.5 inches (Ref. 4, p. 2). Federal Emergency Management Agency Flood Insurance Rate Maps indicate the generating station is on a Zone C, or out of floodplain, surface. The lagoon area rests on both Zone A (100 year floodplain) and Zone B (between 100 and 500 year floodplain) (Ref. 20; Ref. 21).

4.3 SOIL EXPOSURE

The facility is active, with 96 employees in the gas-fired production area and 543 employees in the coal-fired production area (Ref. 23). There are no on-site residents (Ref. 2). Location of Guard House indicates that access is controlled (Figure 3).

Wastes are contained in fiberglass lined concrete surface impoundments prior to storage in the lagoon area or prior to treatment for discharge into Smithers Lake, Rabbs Bayou or Dry Creek via an NPDES permit. The storage areas within the lagoon are lined with 3 feet of compacted clay (Ref. 14, p. 2). Heavy metals are the contaminants of concern (Ref. 6, pp. 1-4; Ref. 5; Ref, 9, pp. 2-11).

4.4 AIR

The contaminants of concern are primarily heavy metals contained in liquids, sludges and dried sludges (Ref. 6, pp. 1-4; Ref. 9, pp. 2-11). Surface impoundments and the lagoon storage areas are not covered. Lead contaminated sandblasting material is stored in open bins (Ref. 6, p. 11). File information does not determine how solvents, waste oils, paint thinner and oil sludges are drummed for removal.

4.5 GROUND WATER RELEASE TO SURFACE WATER

This pathway was not evaluated because the top of the uppermost aquifer is 8 to 10 feet below the bottom of the surface water bodies (Smithers Lake, Rabbs Bayou and Dry Creek) being evaluated (Ref. 1, p. 170; Ref. 12, p. 2).

5. TARGETS

This section characterizes the environmental pathways and associated targets of contaminant migration from the facility.

5.1 GROUND WATER

The nearest wells are located within 1/8 mile of the site (Ref. 2; Ref. 7). The area is not designated as a Wellhead Protection area (Ref. 25). Ground water is the major source of water supply, providing water for residential use, irrigation of crops, livestock watering and industrial use (Ref. 14, p. 6; Ref. 18; Ref. 22). Ground water services approximately 3,000 people within the 4 mile target distance limit (Ref. 2; Ref. 3, p. 57; Ref. 23).

5.2 SURFACE WATER

Surface water is not used as a drinking water source within the target area (Ref. 18; Ref. 22). Livestock are occasionally watered from Rabbs Bayou (Ref. 22). Worthington Lake, approximately 5 miles downstream, is a Bald Eagle rookery (Ref. 8). Other endangered species inhabiting Fort Bend County include the Piping Plover, Whooping Crane, American Alligator and Least Interior Tern (Ref. 31).

5.3 SOIL EXPOSURE

Data analysis of samples collected by Houston Lighting and Power indicate that hazardous substances are found in sludges generated on-site (Ref. 5, pp. 1-9; Ref. 6, pp. 17-31). These sludges are dried and stored in open areas in the lagoon (Ref. 9, pp. 1, 3). Workers actively transport the sludges for storage

(Ref. 11, pp. 7-8). The population within 1 mile is estimated at 1,000 (Ref. 2; Ref. 23).

5.4 AIR

Population within the 4 mile target area is approximately 3,000 (Ref. 2; Ref. 23). Land use is primarily livestock ranching and isolated rice growing (Ref. 17, p. 1; Ref. 18). Worthington Lake, located between 1 and 2 miles from the site, is a known Bald Eagle rookery (Ref. 2; Ref. 8). The Piping Plover, Whooping Crane, American Alligator and Least Interior Tern, also endangered species, are known to inhabit Fort Bend County (Ref. 31).

6. CONCLUSIONS

The W. A. Parish Generating Station provides more than 25% of the electric power for the greater Houston area (Ref. 13, p. 3).

The identified Solid Waste Management Units (SWMUs) include eight surface impoundments, two chemical waste treatment systems, three acid collection/ash ponds, a lagoon storage area, waste oil and oil sludge collection systems, two less than 90 day container storage areas, one bulk storage area and a landfill. An outdoor container storage area received TWC closure plan approval on September 23, 1985 (Ref. 15, p. 2).

The primary pathways of concern are the ground water, surface water, air and soil exposure pathways. Ground water is the major source of drinking water for the area, servicing an estimated 3,000 people. Ground water is also used for livestock watering, crop irrigation and industrial use. Surface water is occasionally used for livestock watering. Approximately 5 miles downstream from the site is Worthington Lake, a Bald Eagle rookery. Other endangered species such as the Piping Plover, Whooping Crane, American Alligator and Least Interior Tern are known to inhabit Fort Bend County. Air and soil exposure pathways are of concern because open surface impoundments, storage bins and the lagoon storage area expose workers and nearby residents to heavy metals.

The financial status of Houston Lighting and Power appears to be sound. The 1989 company sales totaled $3 billion.

ATTACHMENT A

SOLID WASTE MANAGEMENT UNIT LIST

SWMU 1 Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 1:

Located northwest of Unit 5, the impoundment is an above-grade, fiberglass lined concrete basin having two compartments holding 232,000 gallons each (Figure 3) (Ref. 6, p. 10). Opened in 1978, it is used for the collection of low volume chemical wastes including make up demineralizer regenerant wastes (DRW) from Units 1-4 and Units 5 and 6 prior to treatment. Condensate polisher backwash, boiler area, fly ash silo area and precipitator washdown are also collected there. The accumulated demineralizer regenerant inorganic sludge (DRIS) is periodically removed from the basin floors and is sent to the sludge dewatering system. The demineralizer regenerant wastewater from Units 1-6 are treated in the Units 5 and 6 Chemical Waste Treatment System located next to the basins. This system consists of a contact clarifer and primary and secondary pH adjustment. This waste is classified as Class II waste [Texas Water Commission (TWC) 241470] based Extraction Procedure Toxicity Tests (EP Toxicity). Treated wastewater is discharged under NPDES permit no. TX0006394 into Smithers Lake or Dry Creek. Total volume of waste received has not been determined. Estimated 1983 total wastewater discharged from the three demineralizer regenerant wastewater impoundments was 2.1 x 10^9 pounds. (Ref. 6, pp. 1-4; Ref. 9, p. 1).

SWMU 2 Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 2:

The impoundment is located north of the cooling tower (Figure 2) and is a below-grade, fiberglass-lined concrete basin with a storage capacity of 82,000 gallons (Ref. 6, p. 10). Since 1978 it has been used for the temporary storage of demineralizer wastewater from Units 1 through 4 prior to transfer to Units 5 and 6 Chemical Waste Treatment System. The accumulated DRIS is periodically removed from the the basin floor for treatment in the sludge dewatering system. After treatment the wastewater is discharged via an NPDES permit. The waste is classified as Class II waste (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 3 Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 3:

Located north of Units 7 and 8, the impoundment is an above-grade, fiberglass-lined concrete basin with two compartments of 196,000 gallons each (Figure 3) (Ref. 6, p. 10). Opened in 1980, it is used for the collection of low volume chemical wastes, including make up DRW from Units 7 and 8 prior to treatment. These tanks are also used for the collection of condensate polisher backwash, boiler area, fly ash silo area and precipitator washdown. The accumulated demineralizer regeneration wastes are treated in the Units 7 and 8 Chemical Waste Treatment System. Classified as Class II waste (TWC 241470), the treated wastewater is discharged via an NPDES permit (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 4 Chemical Waste Treatment System/Demineralizer Regeneration Sludge/Inorganic Metal Cleaning Waste Sludge

Units 5 and 6 Chemical Waste Treatment System and Units 7 and 8 Chemical Waste Treatment System were activated in 1978 and 1980 respectively (Figure 3). The Systems consist of concrete settling basins (SWMUs 1 and 3) and steel constructed clarifiers with a capacity of approximately 902,000 gallons (Ref. 9, p. 4)and 1,842,000 gallons (Ref. 9, p. 3), respectively. The clarifiers consist of solids contact clarifiers and primary and secondary pH adjustment control system reaction mixing tanks for suspended solids removal and pH adjustment. The sludge generated in the chemical waste treatment systems, containing demineralizer regenerant, boiler blowdown and inorganic metal cleaning waste, is pumped to the sludge dewatering system. The sludge is removed to a thickener and sent through a rotary vacuum filter. Dried sludge is trucked to the ash pond/lagoon. Based on EP Toxicity tests, this waste is classified as Class II waste (TWC 240540) (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 5 Inorganic Metal Cleaning Wastewater Surface Impoundment 1:

Located northwest of Unit 5, the impoundment is an above-grade, fiberglass-lined concrete basin with two compartments holding 850,000 gallons each (Figure 3) (Ref. 9, p. 4). Opened in 1978, it is used for the collection of inorganic metal cleaning wastes (IMCW). These wastes include hydrochloric acid boiler cleaning wastes, boiler blowdown and air preheater wash from Units 1-6. The wastes are collected for treatment in the Units 5 and 6 Chemical Waste Treatment System for pH adjustment, metal precipitation and sedimentation. The metal cleaning inorganic sludge (MCIS) from the basin floors are periodically sent to the sludge dewatering system. Total IMCW for 1983 were 7.5×10^5 pounds. (Ref. 6, p. 4). Classified as a Class II waste (TWC 241210), the treated wastewater is discharged via an NPDES permit to Smithers Lake (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 6 Inorganic Metal Cleaning Wastewater Surface Impoundment 2:

Located north of the cooling tower, the impoundment consists of two below-grade, fiberglass-lined concrete basins holding 21,000 gallons and 54,000 gallons, respectively (Figure 2) (Ref. 9, p. 4). These basins, opened in 1978, collect IMCW from Units 1-4 prior to transfer to Units 5 and 6 IMCW basin (SWMU 5). Sludge from the tank bottoms is sent to the sludge dewatering system. The IMCW is sent through the Units 5 and 6 Chemical Waste Treatment System. Treated wastewater is discharged via an NPDES permit (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 7 Inorganic Metal Cleaning Wastewater Surface Impoundment 3:

Located north of Units 7 and 8, the impoundment is an above-grade, fiberglass-lined concrete basin with two compartments holding 1,189,000 gallons each (Figure 3) (Ref. 6, p. 10). Opened in 1980, the basin collects IMCW, including hydrochloric acid boiler cleaning wastes, boiler blowdown and air preheater wash from Units 7 and 8 prior to treatment in the Chemical Waste Treatment System. The sludge from the basin floor is periodically sent to the sludge dewatering system. After treatment, the wastewater is discharged via an NPDES permit. This waste is classified as Class II waste (6, p. 2; Ref. 9, p. 1).

SWMU 8 Organic Metal Cleaning Waste Surface Impoundment/Organic Metal Cleaning Sludge

Located northwest of Unit 5, the impoundment is a below-grade, fiberglass-lined concrete basin with two compartments holding 178,922 gallons each (Figure 3) (Ref. 9, p. 4). The basin was opened in 1978. The organic metal cleaning wastes (OMCW) consists of hydroxyacetic-formic acid and ammoniated citric acid used in cleaning boilers and equipment. OMCW from Units 5 through 8 are collected by gravity into boiler cleaning waste holding basins, impoundment four. Located west of Boiler Number 2, the basins are used for temporary storage (Figure 2). No other file information is available for this impoundment. The OMCW from Units 5 through 8 are collected in basins adjacent to Units 5 and 6. Prior to early 1980, the OMCW for Units 1 through 8 were injected into the Units 5 and 6 Chemical Waste Treatment System. The organic metal cleaning sludge (OMCS) was periodically removed from the basin bottoms for treatment in the sludge dewatering system. Dried sludge was trucked to the ash pond. Treated wastewater was discharged via an NPDES permit into Smithers Lake. As of late 1980, OMCW is held in basins for injection into an energy producing boiler for incineration. OMCS is removed for treatment and eventual storage in the ash pond. Based on EP Toxicity analysis, the OMCW (TWC 215290) and the OMCS (TWC 248990) are classified as Class II waste (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 9 Inorganic Acid Collection Ponds/Ash Ponds

Three inorganic acid collection ponds comprised of 0.56 acres (500,000 gallons), 0.76 acres (1,000,000 gallons) and 4.27 acres (5,000,000 gallons) (Ref. 9, pp. 5, 9) were excavated in 1977 for temporary use during the construction of Units 5 and 6. Located northeast of the Coal Pile (Figure 3), the natural clay-lined impoundments were used for the disposal of various treatment sludges from the chemical waste and metal cleaning waste treatment systems and ash from coal burning. Wastewater was pumped to Units 5 and 6 wastewater treatment system for treatment prior to NPDES discharge. This waste has been classified as Class II waste (TWC 241210) (Ref. 6, p. 2; Ref. 9, p. 1).

No wastewater entered the impoundments after early 1980. The aboveground piping to the impoundments was removed during construction of Units 7 and 8 wastewater treatment system, which was in service by June of 1980. By March of 1982, all three impoundments had been filled in and graded. Source of the fill is not on file. No soil was removed from the impoundments during this activity. Information concerning diking or berming is not on file. Groundwater migration of contaminants is inhibited by the clayey nature of the soil (Ref. 12, p. 2). Without secondary containment, surface water migration to Smithers Lake and Dry Creek was possible (Ref. 6, p. 3).

SWMU 10 Ash Storage Area/Ash Pond/Lagoon

This area was originally designated to store ash waste generated by coal-fired Units 5 through 8. The area has a registered size of 945.868 acres. Approximately 140 acres were in use prior to 1985 when 30 additional acres were utilized (Ref. 2; Ref. 10, p.1). The area is referred to as an ash storage area or ash pond prior to June 1983. A June 8, 1983 inspection report lists the area as a registered lagoon (Ref. 10, p. 1). The proposal for the area indicated that several containment areas surrounded by earthen embankments would house the waste (Ref. 12, p. 1). As of the 1983 report, there were no dikes surrounding the designated areas (Ref. 10, p. 2).

Soil borings from a 1976 geotechnical investigation by McClelland Engineers, Inc. and a 1985 hydrologic evaluation by Resource Engineering indicate relatively uniform soil conditions throughout the tract. A 35 foot deep layer of primarily highly plastic clay with occasional silty clay or silt lenses, underlain by silty fine sand, was reported. Permeability of the soil is 1×10^{-7} centimeters/second. Replacement of the lenses with compacted clay was recommended prior to storage of wastes (Ref. 12, p. 2; Ref. 14, p. 2). Measurements to the depth of ground water in the boreholes suggest the water level is 8 to 10 feet below the surface (Ref. 12, p.2). The tract has little topographic relief but contains undrained depressions and is dissected by Rabbs Bayou (Ref. 12, p. 4).

The lagoon is used for the disposal of dried treatment sludges from the chemical waste and metal cleaning waste treatment systems, bottom (boiler) ash, fly ash and flue gas desulfurization sludge.

Dried Treatment Sludge

Dried treatment sludge is transported from the chemical waste treatment systems and stored in the southern section of the lagoon area. No file information is available as to the amount of dried sludge present. An approximately 60 acre storage area was in use until 1985. In 1985 an additional 30 acres was utilized (Ref. 14, p. 20). The dried treatment sludge is classified as Class II waste based on EP Toxicity analysis (TWC 241470, TWC 241210) (Ref. 6, p. 10; Ref. 9, pp. 1, 3). With the recorded lack of containment structures, drainage pathways include Rabbs Bayou and Dry Creek, which eventually flow into the Brazos River (Ref. 2). Ground water migration is inhibited by low soil permeability (Ref. 12, p. 2; Ref. 14, p. 2).

Bottom (Boiler) Ash

Bottom ash is stored in the northern section of the lagoon area. This material is retrieved from the boilers and stockpiled prior to being sold for recovery. No file information is available as to waste quantity and EP

Toxicity. Lacking containment structures, the drainage pathway would include Rabbs Bayou and Dry Creek (Ref. 10, p. 2). Ground water migration is inhibited due to the low permeability rate (Ref. 12, p. 2).

Fly Ash

The fly ash disposal is contracted to Ash Management, Inc. of Marietta, Georgia. The disposal area is the only true lagoon in the permitted tract. Fly ash is brought to the lagoon via truck. A portable header transports lagoon water to the truck and the water is mixed with the fly ash to form a slurry. The slurry is then discharged into a system of cells, where the heavier ash settles out and is stored prior to being sold for recovery. Excess water from the cells is discharged back to the lagoon. The waste is classified as Class II waste (Ref. 11, p. 1). The lagoon occupies approximately 40 acres and is not contained (Ref. 2; Ref. 10, p. 2). Surface water drainage would flow into Rabbs Bayou and Dry Creek. Groundwater migration is inhibited by the low soil permeability rate (Ref. 12, p. 2).

Flue Gas Desulfurization Sludge

This sludge is stored just north of the center of the lagoon. Unit 8 utilizes a wet limestone Flue Gas Desulfurization (FGD) System to remove sulfur dioxide from the flue gas. Spent limestone slurry is transported from the FGD system absorbers to a thickener for processing. The sludge from the thickener is then transferred to rotary vacuum filters for dewatering. The sludge is transferred via conveyor belt to plug mills where it is blended with fly ash from Unit 8 to stabilize the product. The stabilized sludge forms a concrete-like substance which is loaded onto trucks for transport to the storage area. Wastewater produced returns to the FDG system or is transferred to the Units 7 and 8 Chemical Waste Treatment System. The approximately 30 acre disposal area within the lagoon is registered with the Texas Department of Water Resources (TDWR) as a Class I disposal site. The sludge was declassified in 1983 as a Class II material (11, pp. 3, 4, 6-8). With 3 feet of natural clay as a liner (Ref. 12, p. 2), ground water migration is inhibited. Drainage pathways lead to Rabbs Bayou and Dry Creek.

SWMU 11 Waste Oil and Sludge/Waste Oil and Sludge Collection Facilities

The waste oil and sludge removed from the oily waste treatment systems are collected in:

for Units 1 through 4: oil traps, API separator, waste oil storage sump, Tricellarator, surface storage tank (2000 gallons) and two lined concrete subsurface basins (1500 gallons each) (Ref. 9, p. 5).

for Units 5 and 6: lift stations, the oily waste treatment system retention pond and the Tricellarator.

for Units 7 and 8: lift stations, the oily waste treatment system retention pond and the Tricellarator.

The oily sludge generated from the oily waste treatment system is classified as Class I non-hazardous or Class II waste depending on the amount of oil present in the sludge. Waste oil and waste oil sludge are drummed and housed in a less than 90-day storage area for off-site disposal (Ref. 6, p. 3; Ref. 9, pp. 1, 2).

SWMU 12 Container Storage Areas

Container Storage Area 1 (less than 90-days)

This enclosed area houses drummed PCB contaminated solids and PCB capacitator fluid prior to shipment off-site for disposal (Ref. 5, pp. 1, 5, 7). No other file information is available for this area.

Container Storage Area 2 (less than 90-days)

This enclosed area, opened in 1980, stores drummed waste paint thinner [estimated 1983 quantity: 2.6×10^3 pounds. (Ref. 6, p. 4)], spent solvent [estimated 1983 quantity: 4.0×10^4 pounds. (Ref. 6, p. 4)] and other miscellaneous storage containers for off-site disposal. Miscellaneous contained materials include:

Asbestos insulation: asbestos used for insulation is placed in bags and wet down prior to off-site disposal. Actual percent asbestos is variable but small. Insulation containing asbestos is classified as a Class I non-hazardous waste (TWC 170750) (Ref.5, p. 2; Ref. 6, p. 11; Ref. 9, p. 5).

Oil and Oil Contaminated Solids: These wastes are drummed and stored prior to off-site disposal (Ref. 5, p. 5; Ref. 6, p. 11).

Other: Other drummed wastes include: diesel contaminated material, mercury contaminated solids, acetone, resin, organic and inorganic phosphates, sodium hydroxide contaminated material, spent antifreeze, and an isopropanol mixture (Ref. 5, p. 5, Ref. 6, p. 11; Ref. 9, p. 5).

Information regarding waste quantity, location and pathways are not on file.

Outdoor Container Storage Area

The outdoor container storage area is the only documented unit that has undergone closure at the generating station. Opened in 1980, the concrete pad housed drummed spent solvents, paint thinner, oily wastes, sandblasting grit and refractory bricks prior to off-site disposal. The storage area was located west of the oil separator pit and adjacent to the Tricellarator (Figure 2). The TWC approved the closure plan September 23, 1985. Documentation of closure indicates that closure did not meet performance standards of 40 CFR 265.111. The Closure Plan and Certification of Closure did not demonstrate how closure activities controlled, minimized or eliminated post-closure escape of hazardous waste, hazardous constituents, contaminated run-off or hazardous waste decomposition products to the soil, ground water, surface water or atmosphere (Ref. 6, p. 11; Ref. 15, p. 2).

SWMU 13 Bulk Storage Area

Opened in 1983, this enclosed facility uses bins for the storage of lead contaminated blasting material prior to off-site disposal. Location, amount of waste and pathway information are not on file (Ref. 6, p. 11).

SWMU 14 Landfill

This unit is for the on-site disposal of construction debris and non-combustible waste. No other file information is available (Ref. 5, p. 6).

HRS DOCUMENTATION LOG SHEET

SITE NAME Houston Light & Power
W.A. Parish Generating Station
CITY Thompsons STATE TX
IDENTIFICATION NUMBER TXD097311849

REFERENCE NUMBER	DESCRIPTION OF THE REFERENCE
1	U.S. Environmental Protection Agency. Draft Final Rule Revised Hazard Ranking System. February 15, 1990.
2	U.S.G.S. 7.5 minute series Topographic map. Missouri City, TX. 1970, photorevised 1980. Smithers Lake, TX. 1953, photorevised 1980. Thompsons, TX. 1953. Sugar Land, TX. 1970, photorevised 1980.
3	U.S. Department of Commerce. Estimates of Households for Counties: July 1, 1985. Issued March 8, 1988.
4	Hershfield, David M. Rainfall Frequency Atlas of the United States. U.S. Department of Agriculture Soil Conservation Service. Technical Paper No. 40. 1961.
5	Texas Water Commission Notice of Registration Solid Waste Management. May 23, 1989.
6	Letter. Revised Part A Application. From: W.F. McGuire, Environmental Protection Department, Houston Lighting and Power. To: Ray Henry, Texas Department of Water Resources. October 9, 1984.
7	Texas Water Well Drillers Board. Well Logs.
8	Record of Communication. Sensitive Environments Near Smithers Lake, Rabbs Bayou, Fort Bend County, Texas. From: Dorinda Sullivan, Data Manager, Natural Heritage Program. To: Carol Cox, FIT Environmental Scientist, EPA Region VI. February 21, 1990. TXD097311849.
9	Process Description for Hazardous Waste Streams. Attachment G. W.A. Parish Generating Station. 1980.

10	Texas Department of Water Resources Open Dump Inventory. Inspector's Comments. Houston Lighting and Power, W.A. Parish Generating Station. Inspection June 8, 1983.
11	Letter. Disposal of Stabilized Flue Gas Desulfurization Wastes at W.A. Parish Generating Station. From: W.F. McGuire, Environmental Protection Department, Houston Lighting and Power. To: Jay Snow, Texas Department of Water Resources. September 20, 1982.
12	Geotechnical Investigation of the Ash Storage Area, W.A. Parish Generating Station. Prepared by McClelland Engineers, Inc. for Houston Lighting and Power. July 28, 1976.
13	Letter. Expansion of Coal Combustion By-Product Storage Area, W.A. Parish Generating Station. From: W.F. McGuire, Environmental Protection Department, Houston Lighting and Power. To: Jay Snow, Texas Department of Water Resources. May 13, 1985.
14	Hydrogeologic Evaluation at the W.A. Parish Generating Station for Houston Lighting and Power. Prepared by Resource Engineering for Houston Lighting and Power Company. December 1985.
15	Letter. Clean Closure Review. From: Arthur Glazer, Kearney/Centaur Division, A.T. Kearney, Inc. To: Tom Clark, U.S. Environmental Protection Agency. December 9, 1988.
16	Ratzlaff, Karl W., et al. Records of Wells, Drillers Logs, Water Level Measurements, and Chemical Analysis of Groundwater in Brazoria, Fort Bend, and Waller Counties, Texas, 1975-79. Texas Department of Water Resources, Report 277. July 1983.
17	Industrial Solid Waste Disposal Compliance Monitoring Inspection Report. Prepared by the Texas Department of Water Resources. August 13, 1984.

18	Record of Communication. Information Concerning Farming, Soil Types and Use of Smithers Lake - Thompson's Area, Fort Bend County, Texas. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Eddie Garcia, Soil Conservation Technician, U.S. Soil Conservation Service. March 2, 1990. TXD097311849.
19	Wastewater Permit Exceedence Notification. Prepared by Houston Lighting and Power. February 27 - April 21, 1990.
20	Federal Emergency Management Agency Flood Insurance Rate Map. Fort Bend County and Certain Political Districts. Map Panel Numbers 245, 400, 425 and 265. Effective August 5, 1986.
21	Record of Communication. Floodplain of Smithers Lake, Rabbs Bayou, Fort Bend County, Texas. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Henry Flemming, Floodplain Management Coordinator, U.S. Corps of Engineers. March 2, 1990. TXD097311849.
22	Record of Communication. Use of Water from Rabbs Bayou; Erosion Control for Smithers Lake - Thompson's Area, Texas. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Eddie Garcia, Soil Conservation Technician, U.S. Soil Conservation Service. March 2, 1990. TXD097311849.
23	Record of Communication. Employee Count for W.A. Parish Generating Station. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Hilda Montecinos, Senior Secretary, W.A. Parish Generating Station. March 7, 1990. TXD097311849.
24	Letter. Administrative Order Docket No. VI-86-020, NPDES Permit No. TX0006394. From: Robert E. Morse, III, Baker and Botts. To: Paul Whitley, EPA Region VI. March 3, 1986.
25	Record of Communication. Wellhead Protection for Southern Fort Bend County, Texas. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Brad Cross, Wellhead Protection Program, Texas Water Commission. April 6, 1990. TXD097311849.

26	Standard and Poor's Register of Corporations, Directors and Executives 1990 - Corporations. Volume 1.
27	U.S. Environmental Protection Agency. Hazardous Waste Permit Application. November 19, 1980.
28	Williams, James F., III, et al. Records of Wells, Drillers Logs, Water Level Measurements and Chemical Analyses of Ground Water in Brazoria, Fort Bend and Waller Counties, Texas. 1980 - 1984. U.S. Geological Survey Open File Report 86 - 68. 1986.
29	Permit: Authorization to Discharge Under the National Pollutant Discharge Elimination System. June 17, 1988.
30	Buckner, H.D., et al. Water Resources Data, Texas, Water Year 1987. Volume 2. U.S. Geological Survey Water Data Report TX-87-2. 1988.
31	Endangered and Threatened Species of Texas and Oklahoma. 1987 with 1988 Addendum. U.S. Fish and Wildlife.
32	U.S. Department of Commerce. Climatic Atlas of the United States. June 1982. Reprinted by the National Oceanic and Atmospheric Administration. 1983.

Reference 1

DRAFT FINAL RULE
HAZARD RANKING SYSTEM

February 15, 1990

Reference 2

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

HOUSTON LIGHTING AND POWER
W. A. PARISH GENERATING STATION

HOUSTON, TX.

TDD NO. F-6-8908-32

CERCLIS NO. TXDO97311849

QUADRANGLES

SUGAR LAND, TX
MISSOURI CITY, TX
SMITHERS LAKE, TX
THOMPSONS, TX

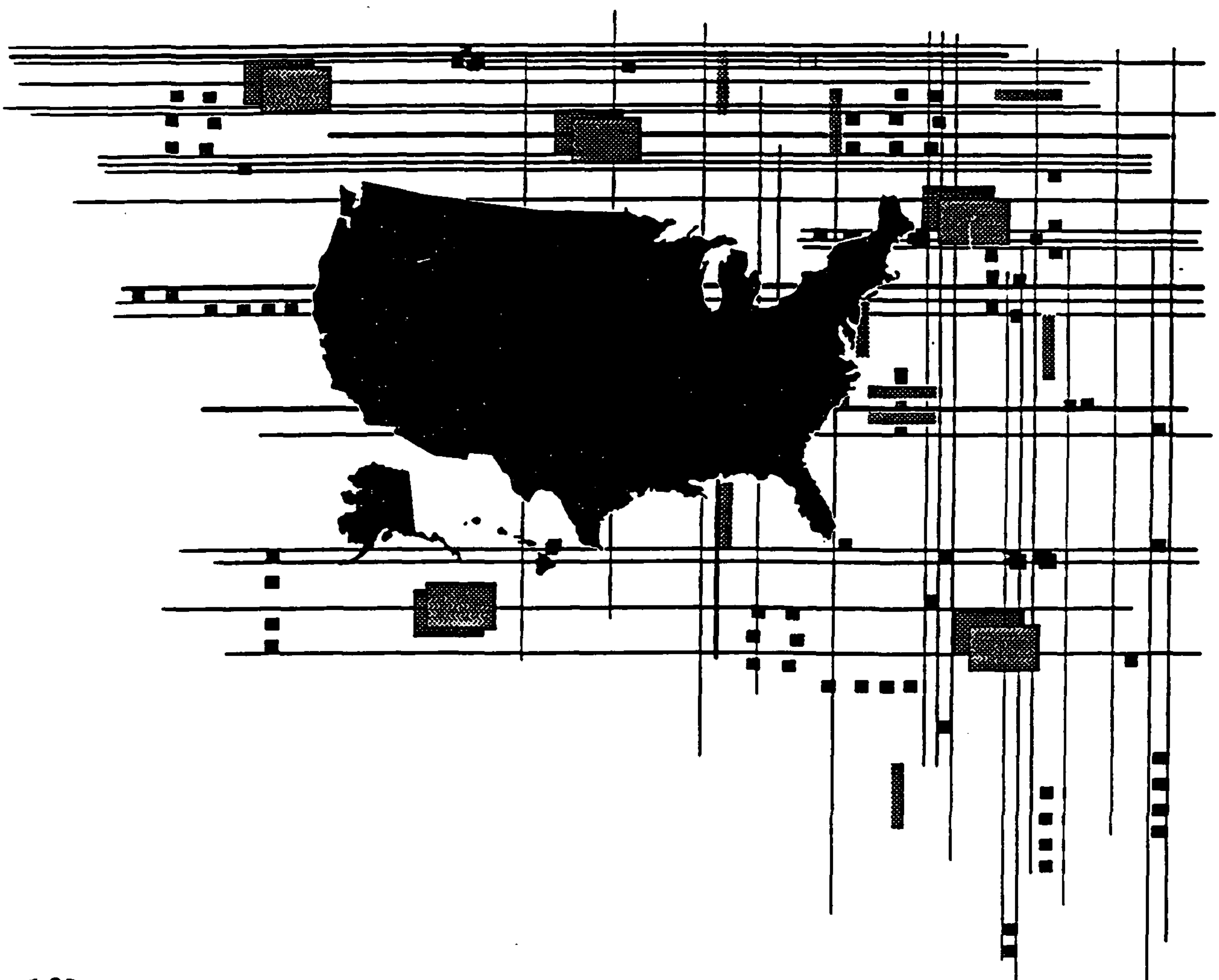
Reference 3

CURRENT POPULATION REPORTS

Special Studies

Series P-23, No. 156

Estimates of Households, for Counties: July 1,1985



U.S. Department of Commerce
BUREAU OF THE CENSUS

Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

State and county	Households				Average population per household		Population			
	July 1, 1985 (estimate)	April 1, 1980 (census)	Change, 1980-85 Number	Change, 1980-85 Percent	July 1, 1985 (estimate)	April 1, 1980 (census)	July 1, 1985 (estimate)	April 1, 1980 (census)	Change, 1980-85 Number	Change, 1980-85 Percent
Tennessee—Continued										
Lincoln	10,000	9,533	500	4.7	2.67	2.75	26,900	26,483	500	1.7
Loudon	11,300	10,289	1,000	10.2	2.65	2.75	30,400	28,553	1,800	6.4
McMinn	15,800	14,727	1,100	7.2	2.71	2.81	43,200	41,878	1,300	3.1
McNairy	8,800	8,179	700	8.1	2.63	2.73	23,400	22,525	900	4.0
Macon	5,800	5,645	200	3.1	2.71	2.75	15,900	15,700	200	1.4
Madison	28,900	26,713	2,200	8.2	2.61	2.71	77,800	74,546	3,200	4.3
Marion	8,800	8,270	500	6.3	2.79	2.93	24,700	24,416	300	1.4
Marshall	7,600	7,144	500	6.3	2.68	2.72	20,600	19,698	900	4.8
Maury	19,900	18,180	1,700	9.6	2.64	2.78	53,300	51,095	2,200	4.2
Meigs	2,700	2,520	200	8.0	2.86	2.95	7,800	7,431	400	4.8
Monroe	10,500	9,637	900	9.2	2.81	2.93	30,200	28,700	1,500	5.4
Montgomery	31,600	27,198	4,400	16.1	2.67	2.87	89,800	83,342	6,500	7.8
Moore	1,800	1,534	300	17.5	2.76	2.94	5,000	4,510	500	10.4
Morgan	5,800	5,389	400	7.0	2.87	3.00	16,900	16,604	300	2.0
Obion	12,800	12,079	800	6.4	2.57	2.70	33,200	32,781	400	1.3
Overton	6,300	6,122	200	3.3	2.79	2.85	17,800	17,575	200	1.4
Perry	2,600	2,240	300	14.2	2.53	2.71	6,500	6,111	400	6.8
Pickett	1,600	1,542	100	5.2	2.78	2.82	4,500	4,358	200	3.6
Polk	4,800	4,607	100	3.2	2.86	2.95	13,700	13,602	-	0.4
Putnam	18,600	16,706	1,900	11.5	2.50	2.65	50,700	47,690	3,000	6.2
Rhea	8,800	8,285	500	6.2	2.74	2.85	24,700	24,235	500	1.9
Roane	18,300	17,078	1,200	7.3	2.70	2.82	49,700	48,425	1,300	2.7
Robertson	13,700	12,532	1,200	9.4	2.85	2.93	39,400	37,021	2,400	6.5
Rutherford	34,100	28,002	6,100	21.9	2.74	2.84	98,600	84,058	14,600	17.3
Scott	6,900	6,200	700	10.8	3.00	3.09	20,700	19,259	1,400	7.5
Sequatchie	3,000	2,891	200	5.3	2.87	2.93	8,900	8,605	300	3.1
Sevier	17,000	14,741	2,300	15.6	2.72	2.79	46,600	41,418	5,200	12.5
Shelby	291,500	269,186	22,300	8.3	2.68	2.81	803,600	777,113	26,500	3.4
Smith	5,300	5,392	-100	-1.5	2.72	2.76	14,500	14,935	-400	-2.7
Stewart	3,500	3,104	400	11.3	2.68	2.79	9,300	8,665	600	7.1
Sullivan	54,600	52,022	2,600	5.0	2.64	2.75	145,600	143,968	1,600	1.1
Sumner	33,400	28,557	4,900	17.1	2.79	2.99	93,900	85,790	8,100	9.4
Tipton	12,000	10,778	1,200	11.6	2.91	3.04	35,200	32,930	2,300	6.9
Trousdale	2,100	2,227	-100	-4.5	2.73	2.73	5,800	6,137	-300	-4.7
Unicoi	6,300	5,948	300	5.1	2.68	2.74	16,900	16,362	500	3.0
Union	4,300	3,947	400	9.4	2.82	2.96	12,200	11,707	500	4.2
Van Buren	1,700	1,590	100	6.6	2.88	2.97	4,900	4,728	200	3.4
Warren	12,700	11,869	800	7.0	2.62	2.74	33,500	32,653	800	2.6
Washington	33,400	31,191	2,300	7.2	2.59	2.71	92,600	88,755	3,800	4.3
Wayne	5,100	4,792	300	5.9	2.76	2.88	14,200	13,946	200	1.5
Weakley	11,600	11,567	-	0.1	2.57	2.60	33,200	32,896	300	1.0
White	7,500	6,988	500	7.3	2.64	2.78	19,900	19,567	300	1.7
Williamson	22,900	18,723	4,200	22.6	2.97	3.08	68,700	58,108	10,600	18.2
Wilson	21,900	18,863	3,000	16.1	2.81	2.94	62,500	56,064	6,400	11.4
Texas	5,796,000	4,929,267	867,000	17.6	2.76	2.82	16,385,000	14,229,191	2,156,000	15.2
Anderson	14,300	12,386	2,000	15.8	2.70	2.70	46,800	38,381	8,500	22.1
Andrews	5,300	4,423	900	19.9	3.08	2.99	16,400	13,323	3,100	23.4
Angelina	23,700	21,781	1,900	8.7	2.84	2.88	68,700	64,172	4,600	7.1
Aransas	6,500	5,168	1,400	26.7	2.69	2.75	17,600	14,260	3,400	23.6
Archer	2,800	2,644	100	5.2	2.78	2.73	7,800	7,266	500	7.2
Armstrong	700	750	-100	-8.7	2.67	2.59	1,900	1,994	-100	-5.8
Atascosa	9,000	8,036	1,000	12.5	3.11	3.09	28,400	25,055	3,300	13.3
Austin	7,300	6,434	900	13.4	2.80	2.71	20,800	17,726	3,000	17.1
Bailey	2,700	2,681	-	-0.2	3.06	3.02	8,300	8,168	100	1.2
Bandera	3,600	2,802	800	28.3	2.46	2.48	9,000	7,084	1,900	27.1

Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

State and county	Households: July 1, 1985 (estimate)	Households: April 1, 1980 (census)	Households: Change, 1980-85: Number	Households: Change, 1980-85: Percent	Average population per household: July 1, 1985 (estimate)	Average population per household: April 1, 1980 (census)	Population: July 1, 1985 (estimate)	Population: April 1, 1980 (census)	Population: Change, 1980-85: Number	Population: Change, 1980-85: Percent
Texas—Continued										
Bastrop	12,200	8,719	3,500	39.8	2.75	2.78	34,300	24,726	9,600	38.8
Baylor	2,100	2,027	-	2.4	2.25	2.39	4,700	4,919	-200	-3.7
Bee	8,700	8,181	500	6.0	3.00	3.06	26,900	26,030	800	3.2
Bell	63,700	52,661	11,100	21.0	2.59	2.79	174,900	157,889	17,000	10.8
Bexar	378,300	320,639	57,600	18.0	2.92	2.98	1,139,100	988,800	150,300	15.2
Blanco	2,200	1,825	400	20.0	2.53	2.52	5,600	4,681	1,000	20.6
Borden	300	299	-	-1.3	2.97	2.87	900	859	-	2.0
Bosque	5,900	5,513	400	6.7	2.34	2.36	14,100	13,401	700	5.5
Bowie	30,200	27,449	2,700	9.9	2.63	2.70	80,500	75,301	5,200	6.9
Brazoria	59,900	53,907	6,000	11.1	2.99	3.00	187,200	169,587	17,600	10.4
Brazos	43,300	32,488	10,800	33.2	2.57	2.60	121,500	93,588	27,900	29.8
Brewster	2,900	2,694	200	5.8	2.60	2.63	7,900	7,573	400	4.7
Briscoe	900	967	-100	-9.0	2.59	2.67	2,300	2,579	-300	-11.7
Brooks	2,900	2,614	300	10.3	3.16	3.20	9,200	8,428	800	8.9
Brown	13,100	12,308	800	6.3	2.54	2.56	34,500	33,057	1,500	4.5
Burleson	5,300	4,459	800	18.0	2.79	2.73	14,800	12,313	2,500	20.6
Burnet	8,800	6,951	1,900	26.7	2.57	2.53	22,900	17,803	5,100	28.5
Caldwell	9,000	7,361	1,700	22.4	2.73	2.85	27,800	23,637	4,200	17.8
Calhoun	7,500	6,469	1,000	15.7	2.86	3.01	21,600	19,574	2,000	10.2
Callahan	4,800	4,150	600	15.6	2.57	2.61	12,500	10,992	1,500	13.7
Cameron	73,900	58,418	15,500	26.6	3.37	3.56	252,000	209,727	42,300	20.2
Camp	3,700	3,404	300	8.7	2.68	2.70	10,000	9,275	700	7.9
Carson	2,500	2,395	100	2.9	2.72	2.73	6,800	6,672	200	2.5
Cass	10,900	10,515	400	4.0	2.75	2.76	30,500	29,430	1,100	3.6
Castro	3,100	3,136	-100	-2.6	3.36	3.34	10,300	10,556	-200	-2.1
Chambers	6,600	6,248	400	5.8	2.96	2.96	19,600	18,538	1,100	5.9
Cherokee	14,500	13,627	900	6.4	2.63	2.67	39,700	38,127	1,500	4.0
Childress	2,600	2,776	-200	-6.4	2.44	2.46	6,500	6,950	-500	-7.1
Clay	3,700	3,607	-	1.3	2.62	2.62	9,700	9,582	100	1.0
Cochran	1,400	1,515	-100	-4.4	3.22	3.12	4,800	4,825	-100	-1.3
Coke	1,400	1,257	200	12.2	2.42	2.47	3,500	3,196	300	9.9
Coleman	4,300	4,243	100	2.5	2.35	2.41	10,400	10,439	-	-0.2
Collin	65,000	46,373	18,600	40.2	2.98	3.08	195,900	144,576	51,300	35.5
Collingsworth	1,600	1,790	-200	-13.4	2.54	2.56	4,000	4,648	-700	-14.0
Colorado	7,300	6,938	400	5.4	2.71	2.67	20,200	18,823	1,300	7.2
Comal	16,800	12,958	3,800	29.5	2.74	2.77	46,600	36,446	10,100	27.8
Comanche	5,200	4,973	200	4.2	2.44	2.48	12,900	12,617	300	2.3
Concho	1,000	1,091	-100	-5.9	2.70	2.64	2,800	2,915	-100	-3.7
Cooke	10,500	10,078	500	4.7	2.70	2.68	29,100	27,656	1,500	5.3
Coryell	14,800	14,090	700	5.1	3.04	3.06	59,300	56,767	2,500	4.5
Cottle	1,000	1,164	-100	-12.8	2.57	2.49	2,700	2,947	-300	-9.9
Crane	1,700	1,552	100	9.2	2.90	2.95	4,900	4,600	300	7.6
Crockett	1,600	1,558	100	5.3	2.83	2.93	4,700	4,608	100	1.7
Crosby	2,900	2,920	-	-0.3	2.84	3.00	8,400	8,859	-500	-5.7
Culberson	1,100	987	100	9.5	3.11	3.35	3,400	3,315	100	1.7
Dallam	2,400	2,386	-	1.8	2.73	2.74	6,600	6,531	100	1.7
Dallas	689,600	577,701	111,900	19.4	2.57	2.66	1,794,000	1,556,390	237,600	15.3
Dawson	5,700	5,483	300	4.8	2.81	2.93	16,300	16,184	100	0.5
Deaf Smith	6,300	6,487	-200	-3.2	3.18	3.24	20,100	21,165	-1,100	-5.1
Delta	1,900	1,932	-	-1.8	2.44	2.45	4,700	4,839	-100	-2.2
Denton	66,700	49,134	17,500	35.7	2.72	2.77	188,700	143,126	45,600	31.8
De Witt	7,400	7,056	300	4.7	2.65	2.61	20,000	18,903	1,100	5.9
Dickens	1,200	1,369	-200	-15.2	2.65	2.56	3,100	3,539	-400	-12.5
Dimmit	3,400	3,135	200	6.9	3.47	3.58	11,800	11,367	400	3.5
Donley	1,600	1,608	-	-2.6	2.45	2.43	4,000	4,075	-	-1.1

Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

State and county	Households: July 1, 1985 (estimate)	Households: April 1, 1980 (census)	Households: Change, 1980-85: Number	Households: Change, 1980-85: Percent	Average population per household: July 1, 1985 (estimate)	Average population per household: April 1, 1980 (census)	Population: July 1, 1985 (estimate)	Population: April 1, 1980 (census)	Population: Change, 1980-85: Number	Population: Change, 1980-85: Percent
Texas—Continued										
Duval	3,900	3,738	200	5.4	3.35	3.30	13,400	12,517	900	6.9
Eastland	8,000	7,730	300	3.5	2.43	2.39	20,500	19,480	1,000	5.1
Ector	46,900	40,450	6,400	15.9	2.84	2.83	134,100	115,374	18,700	16.2
Edwards	700	697	-	4.7	2.83	2.92	2,100	2,033	-	1.5
Ellis	25,000	19,866	5,100	25.6	2.90	2.94	73,700	59,743	13,900	23.3
El Paso	164,100	140,806	23,300	16.5	3.26	3.32	549,900	479,899	70,000	14.6
Erath	9,900	8,699	1,200	14.4	2.36	2.44	24,900	22,560	2,300	10.2
Falls	6,800	6,920	-100	-1.8	2.53	2.53	17,700	17,946	-300	-1.5
Fannin	9,300	9,267	100	0.8	2.54	2.53	24,500	24,285	300	1.1
Fayette	7,900	7,487	400	5.4	2.56	2.49	20,400	18,832	1,600	8.5
Fisher	2,100	2,204	-100	-4.7	2.67	2.62	5,700	5,891	-200	-2.8
Floyd	3,100	3,307	-200	-6.4	2.88	2.95	9,000	9,834	-800	-8.4
Foard	700	860	-100	-14.4	2.48	2.45	1,900	2,158	-300	-13.3
Fort Bend	57,600	39,840	17,700	44.5	3.15	3.20	186,300	130,846	55,400	42.4
Franklin	2,700	2,616	100	4.0	2.59	2.59	7,200	6,893	300	4.2
Freestone	6,400	5,608	800	14.9	2.58	2.57	17,100	14,830	2,300	15.3
Frio	4,100	4,041	100	1.6	3.48	3.37	14,400	13,785	600	4.6
Gaines	4,500	4,190	300	8.0	3.23	3.12	14,700	13,150	1,500	11.6
Galveston	77,400	69,284	8,100	11.7	2.72	2.79	214,000	195,940	18,000	9.2
Garza	1,900	1,842	100	5.3	2.80	2.87	5,500	5,336	200	3.0
Gillespie	6,200	5,219	900	18.0	2.44	2.53	15,500	13,532	1,900	14.3
Glasscock	400	387	-	-9.3	3.48	3.37	1,200	1,304	-100	-6.3
Goliad	1,900	1,777	200	8.5	2.91	2.88	5,700	5,193	500	9.4
Gonzales	6,600	5,949	600	10.9	2.78	2.78	18,700	16,883	1,800	10.8
Gray	10,500	10,224	300	3.1	2.53	2.56	26,900	26,386	600	2.1
Grayson	36,800	33,972	2,800	8.4	2.56	2.58	96,900	89,796	7,100	7.9
Gregg	41,200	35,884	5,300	14.7	2.67	2.71	112,000	99,487	12,500	12.6
Grimes	5,800	4,857	1,000	20.3	2.86	2.76	19,200	13,580	5,600	41.4
Guadalupe	19,000	15,733	3,300	21.1	2.83	2.90	55,000	46,708	8,300	17.7
Hale	12,400	12,385	100	0.5	2.91	2.97	37,000	37,592	-600	-1.5
Hall	2,000	2,175	-200	-7.2	2.36	2.54	4,800	5,594	-800	-13.5
Hamilton	3,300	3,423	-200	-4.7	2.34	2.35	7,900	8,297	-400	-4.8
Hansford	2,400	2,269	100	6.0	2.71	2.73	6,500	6,209	300	5.3
Hardeman	2,400	2,476	-100	-2.7	2.62	2.53	6,400	6,368	-	0.5
Hardin	14,700	13,727	1,000	7.2	2.89	2.95	42,800	40,721	2,100	5.2
Harris	1,035,800	869,882	165,900	19.1	2.67	2.75	2,784,000	2,409,547	374,500	15.5
Harrison	19,900	18,049	1,900	10.5	2.83	2.82	57,400	52,265	5,100	9.8
Hartley	1,300	1,361	-100	-6.4	2.73	2.87	3,600	3,987	-400	-11.0
Haskell	2,900	2,981	-100	-3.6	2.48	2.55	7,300	7,725	-500	-6.0
Hays	18,700	12,583	6,100	48.4	2.78	2.82	56,600	40,594	16,000	39.5
Hemphill	1,800	1,837	-100	-3.6	2.94	2.85	5,300	5,304	-	-0.5
Henderson	20,000	16,087	3,900	24.1	2.57	2.60	52,100	42,606	9,500	22.3
Hidalgo	99,800	75,816	23,900	31.6	3.54	3.71	355,800	283,229	72,500	25.6
Hill	10,500	9,683	900	8.9	2.52	2.52	27,300	25,024	2,200	8.9
Hockley	7,800	7,522	300	4.4	3.11	3.01	25,100	23,230	1,800	7.9
Hood	9,700	6,759	2,900	43.6	2.60	2.59	25,600	17,714	7,900	44.5
Hopkins	10,900	9,528	1,400	14.2	2.60	2.61	28,700	25,247	3,500	13.9
Houston	7,500	7,204	300	4.7	2.62	2.60	22,800	22,299	500	2.2
Howard	13,300	11,965	1,400	11.4	2.62	2.68	36,100	33,142	2,900	8.8
Hudspeth	700	822	-100	-9.9	3.41	3.30	2,500	2,728	-200	-7.0
Hunt	24,600	20,331	4,200	20.8	2.58	2.61	65,400	55,248	10,200	18.4
Hutchinson	10,200	9,837	300	3.4	2.72	2.64	27,900	26,304	1,600	6.2
Irion	700	507	200	36.8	2.82	2.73	2,000	1,386	600	41.3
Jack	2,900	2,894	-	-0.1	2.61	2.53	7,600	7,408	200	3.2
Jackson	4,600	4,685	-	-0.8	2.88	2.82	13,500	13,352	200	1.2

Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

State and county	Households				Average population per household		Population			
	July 1, 1985 (estimate)	April 1, 1980 (census)	Change, 1980-85 Number	Change, 1980-85 Percent	July 1, 1985 (estimate)	April 1, 1980 (census)	July 1, 1985 (estimate)	April 1, 1980 (census)	Change, 1980-85 Number	Change, 1980-85 Percent
Texas—Continued										
Jasper	11,100	10,708	400	4.0	2.87	2.85	32,100	30,781	1,400	4.4
Jeff Davis	600	592	-	5.9	2.79	2.75	1,800	1,647	100	7.5
Jefferson	91,700	90,245	1,500	1.6	2.71	2.73	253,300	250,938	2,400	1.0
Jim Hogg	1,600	1,564	-	1.9	3.41	3.30	5,400	5,168	300	5.3
Jim Wells	12,300	11,165	1,100	10.2	3.25	3.26	40,100	36,498	3,600	10.0
Johnson	29,900	23,122	6,800	29.2	2.89	2.88	87,400	67,649	19,800	29.2
Jones	6,800	6,367	400	6.4	2.62	2.66	18,100	17,268	800	4.9
Karnes	4,400	4,522	-100	-3.2	3.00	2.96	13,300	13,593	-300	-1.9
Kaufman	16,700	13,154	3,500	26.9	2.84	2.83	49,200	39,015	10,100	26.0
Kendall	5,000	3,801	1,200	32.7	2.67	2.74	13,800	10,635	3,200	29.8
Kenedy	200	169	-	13.1	3.18	3.20	600	543	100	12.5
Kent	400	431	-	1.9	2.60	2.61	1,200	1,145	-	1.6
Kerr	13,800	11,171	2,600	23.6	2.42	2.46	34,700	28,780	6,000	20.7
Kimble	1,700	1,564	200	10.9	2.39	2.56	4,200	4,063	200	3.7
King	100	154	-	-5.6	2.75	2.76	400	425	-	-5.9
Kinney	800	771	100	7.9	2.90	2.96	2,400	2,279	100	5.8
Kleberg	11,000	10,280	800	7.3	2.95	3.03	34,200	33,358	800	2.4
Knox	2,100	2,042	100	4.5	2.52	2.55	5,500	5,329	200	3.1
Lamar	16,800	15,710	1,100	6.7	2.62	2.63	44,700	42,156	2,500	6.0
Lamb	5,800	6,408	-600	-9.0	2.88	2.89	16,900	18,669	-1,700	-9.3
Lampasas	5,400	4,414	1,000	22.9	2.50	2.68	13,800	12,005	1,800	14.8
La Salle	1,900	1,726	200	11.0	2.96	3.19	5,700	5,514	200	3.0
Lavaca	6,800	7,150	-400	-5.0	2.66	2.61	18,400	19,004	-600	-3.1
Lee	4,700	3,856	800	21.4	2.77	2.73	13,500	10,952	2,600	23.3
Leon	4,900	3,826	1,100	29.2	2.52	2.48	12,600	9,594	3,000	31.6
Liberty	18,600	16,227	2,400	14.9	2.88	2.88	54,100	47,088	7,000	14.8
Limestone	7,800	7,421	400	5.6	2.50	2.47	21,400	20,224	1,100	5.6
Lipscomb	1,400	1,402	-	-1.6	2.77	2.69	3,800	3,766	100	1.6
Live Oak	3,200	3,306	-200	-4.6	2.98	2.88	9,500	9,606	-100	-1.4
Llano	5,300	4,402	900	21.1	2.21	2.23	12,200	10,144	2,000	20.1
Loving	-	34	-	-6.6	2.74	2.68	100	91	-	-4.4
Lubbock	79,100	72,627	6,500	8.9	2.69	2.76	222,500	211,651	10,900	5.1
Lynn	2,600	2,829	-200	-6.7	2.96	3.03	7,800	8,605	-800	-8.9
McCulloch	3,600	3,400	200	6.7	2.47	2.51	9,200	8,735	400	5.1
McLennan	67,700	61,554	6,200	10.0	2.62	2.65	185,200	170,755	14,400	8.5
McMullen	400	297	100	18.5	2.74	2.66	1,000	789	200	22.4
Madison	3,500	3,107	400	12.2	2.66	2.65	11,800	10,649	1,200	11.1
Marion	3,700	3,874	-200	-3.9	2.67	2.65	10,000	10,360	-300	-3.1
Martin	1,700	1,547	200	9.8	3.08	2.99	5,300	4,684	600	13.2
Mason	1,400	1,461	-	-3.3	2.48	2.47	3,600	3,683	-100	-2.9
Matagorda	13,800	13,110	700	5.3	2.90	2.87	40,300	37,828	2,400	6.5
Maverick	8,800	7,583	1,200	15.6	4.08	4.05	36,600	31,398	5,200	16.5
Medina	8,000	7,457	600	7.8	3.08	3.06	25,100	23,164	2,000	8.5
Menard	900	917	-100	-6.3	2.60	2.52	2,300	2,346	-100	-3.2
Midland	39,300	29,650	9,700	32.6	2.75	2.77	108,600	82,636	25,900	31.4
Milam	8,400	8,299	100	1.7	2.78	2.70	23,700	22,732	1,000	4.4
Mills	1,800	1,772	100	2.9	2.40	2.43	4,600	4,477	100	1.7
Mitchell	3,300	3,304	-	-1.0	2.71	2.70	9,000	9,088	-	-0.5
Montague	7,300	6,837	500	6.9	2.45	2.48	18,400	17,410	1,000	5.6
Montgomery	51,500	41,487	10,000	24.1	3.05	3.09	157,500	128,487	29,000	22.6
Moore	5,900	5,590	300	4.8	2.93	2.96	17,200	16,575	700	4.0
Morris	5,200	5,187	-	0.1	2.75	2.78	14,500	14,629	-100	-1.0
Motley	700	812	-100	-9.1	2.34	2.40	1,700	1,950	-200	-11.5
Nacogdoche	18,000	16,457	1,600	9.6	2.51	2.58	50,100	46,786	3,300	7.0
Navarro	14,700	13,331	1,400	10.5	2.59	2.59	39,200	35,323	3,900	11.0
Newton	4,500	4,470	100	1.1	2.92	2.95	13,300	13,254	-	0.2

Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

State and county	Households				Average population per household		Population			
	July 1, 1985 (estimate)	April 1, 1980 (census)	Change, 1980-85 Number	Change, 1980-85 Percent	July 1, 1985 (estimate)	April 1, 1980 (census)	July 1, 1985 (estimate)	April 1, 1980 (census)	Change, 1980-85 Number	Change, 1980-85 Percent
Texas—Continued										
Nolan	6,500	6,446	100	0.8	2.71	2.66	17,800	17,359	400	2.6
Nueces	100,100	86,989	13,200	15.1	2.94	3.04	298,600	268,215	30,300	11.3
Ochiltree	4,000	3,486	500	14.6	2.73	2.73	11,000	9,588	1,400	14.4
Oldham	800	674	100	14.4	2.60	2.80	2,500	2,283	200	7.7
Orange	28,600	27,918	700	2.5	2.90	2.98	83,600	83,838	-200	-0.3
Palo Pinto	9,800	8,977	800	8.8	2.67	2.63	26,500	24,062	2,400	10.1
Panola	7,800	7,434	300	4.5	2.80	2.74	22,100	20,724	1,300	6.4
Parker	19,900	15,640	4,300	27.4	2.80	2.81	56,500	44,609	11,900	26.6
Parmer	3,400	3,489	-100	-1.5	3.14	3.13	10,900	11,038	-200	-1.4
Pecos	5,600	4,567	1,100	23.0	3.05	3.19	17,200	14,618	2,600	17.7
Polk	10,800	8,909	1,900	21.2	2.69	2.72	29,200	24,407	4,800	19.8
Potter	41,800	37,769	4,000	10.7	2.52	2.58	107,000	98,637	8,300	8.5
Presidio	1,800	1,680	100	8.5	3.08	3.08	5,600	5,188	400	8.5
Rains	2,200	1,911	300	15.1	2.61	2.53	5,700	4,839	900	18.5
Randall	31,200	26,709	4,500	16.9	2.72	2.73	86,700	75,062	11,700	15.5
Reagan	1,500	1,305	200	16.5	3.25	3.16	5,000	4,135	800	19.7
Real	1,000	900	100	10.4	2.75	2.74	2,700	2,469	300	10.8
Red River	5,700	6,042	-300	-5.7	2.70	2.62	15,700	16,101	-400	-2.6
Reeves	5,100	4,789	300	6.1	3.10	3.26	15,900	15,801	100	0.9
Refugio	3,000	3,168	-100	-4.2	2.81	2.91	8,600	9,289	-700	-7.4
Roberts	400	426	-100	-16.2	2.88	2.79	1,000	1,187	-200	-13.5
Robertson	5,900	5,518	400	6.5	2.69	2.62	16,000	14,653	1,300	9.2
Rockwall	7,000	4,865	2,200	44.2	2.99	2.96	21,200	14,528	6,600	45.7
Runnels	4,600	4,496	100	1.8	2.69	2.61	12,500	11,872	600	5.0
Rusk	15,300	15,011	300	1.9	2.77	2.71	43,000	41,382	1,600	3.9
Sabine	3,900	3,336	500	16.3	2.51	2.59	9,800	8,702	1,100	13.1
San Augustine	3,300	3,133	200	6.6	2.58	2.74	8,800	8,785	-	0.5
San Jacinto	4,800	4,088	700	17.8	2.88	2.79	13,900	11,434	2,400	21.3
San Patricio	18,700	17,551	1,200	6.7	3.25	3.28	61,200	58,013	3,200	5.5
San Saba	2,200	2,385	-200	-6.6	2.48	2.54	5,700	6,204	-500	-8.5
Schleicher	1,100	988	100	10.9	2.78	2.82	3,100	2,820	300	9.3
Scurry	7,000	6,376	600	9.1	2.81	2.80	19,900	18,192	1,700	9.6
Shackelford	1,400	1,493	-	-3.0	2.66	2.58	3,900	3,915	-	0.1
Shelby	9,000	8,555	500	5.6	2.62	2.67	23,900	23,084	900	3.7
Sherman	1,200	1,117	100	4.7	2.66	2.81	3,100	3,174	-	-0.8
Smith	55,300	46,042	9,200	20.0	2.67	2.73	150,500	128,366	22,200	17.3
Somervell	1,600	1,531	100	4.9	2.77	2.68	4,500	4,154	300	8.3
Starr	8,900	6,858	2,100	29.9	3.84	3.94	34,500	27,266	7,200	26.5
Stephens	4,200	3,928	300	6.6	2.49	2.51	10,500	9,926	600	5.6
Sterling	600	413	200	36.4	2.81	2.85	1,600	1,206	400	34.7
Stonewall	900	941	-	-5.2	2.57	2.48	2,400	2,406	-100	-2.3
Sutton	1,700	1,675	100	3.1	3.04	3.04	5,300	5,130	200	2.9
Swisher	3,200	3,294	-100	-4.1	2.81	2.93	8,900	9,723	-800	-8.0
Tarrant	388,200	310,272	77,900	25.1	2.68	2.72	1,059,600	860,880	198,700	23.1
Taylor	44,200	38,515	5,700	14.8	2.62	2.69	122,600	110,932	11,600	10.5
Terrell	500	570	-	-5.3	2.81	2.80	1,500	1,595	-100	-4.7
Terry	5,200	4,841	300	6.5	2.94	2.98	15,300	14,581	700	5.0
Throckmorton	900	853	-	5.2	2.39	2.38	2,200	2,053	100	5.5
Titus	8,500	7,740	700	9.2	2.67	2.73	23,000	21,442	1,500	7.1
Tom Green	35,400	30,369	5,100	16.7	2.64	2.67	97,500	84,784	12,700	15.0
Travis	206,700	158,432	48,300	30.5	2.48	2.53	533,700	419,573	114,100	27.2
Trinity	4,400	3,647	800	21.3	2.60	2.55	11,700	9,450	2,300	23.8
Tyler	6,700	5,870	800	14.1	2.73	2.73	18,500	16,223	2,300	14.0
Upshur	11,000	10,082	1,000	9.6	2.88	2.82	32,000	28,595	3,400	12.0
Upton	1,800	1,560	300	16.3	3.04	2.95	5,500	4,619	900	19.9
Uvalde	7,900	6,960	900	12.9	3.05	3.16	24,400	22,441	2,000	8.9

Table 1. Estimates of Households, for Counties: July 1, 1985—Continued

(A dash (-) represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are not included. See text concerning rounding and average population per household)

State and county	Households: July 1, 1985 (estimate)	Households: April 1, 1980 (census)	Households: Change, 1980-85: Number	Households: Change, 1980-85: Percent	Average population per household: July 1, 1985 (estimate)	Average population per household: April 1, 1980 (census)	Population: July 1, 1985 (estimate)	Population: April 1, 1980 (census)	Population: Change, 1980-85: Number	Population: Change, 1980-85: Percent
Texas—Continued										
Val Verde	11,800	10,355	1,400	13.7	3.27	3.38	39,500	35,910	3,500	9.9
Van Zandt	13,700	11,660	2,000	17.3	2.69	2.65	37,400	31,426	6,000	19.0
Victoria	24,900	22,988	1,900	8.5	2.98	2.96	75,300	68,807	6,500	9.5
Walker	15,000	11,813	3,200	27.1	2.58	2.54	51,900	41,789	10,100	24.1
Waller	7,500	5,726	1,800	30.6	2.85	2.93	23,600	19,798	3,800	19.2
Ward	5,200	4,765	500	9.6	2.98	2.90	15,800	13,976	1,800	12.7
Washington	8,900	7,817	1,000	13.3	2.68	2.62	25,400	21,998	3,400	15.6
Webb	32,200	25,896	6,300	24.5	3.63	3.79	118,400	99,258	19,100	19.3
Wharton	13,900	13,887	-	0.1	2.94	2.86	41,400	40,242	1,200	2.9
Wheeler	2,600	2,740	-100	-3.7	2.67	2.58	7,100	7,137	-	-0.6
Wichita	46,400	43,134	3,300	7.6	2.56	2.63	126,600	121,082	5,600	4.6
Wilbarger	6,200	5,983	200	3.5	2.59	2.53	16,900	15,931	900	5.8
Willacy	5,400	4,760	700	14.1	3.46	3.66	18,900	17,495	1,400	7.9
Williamson	35,800	24,932	10,900	43.6	2.93	3.00	107,200	76,521	30,600	40.0
Wilson	6,100	5,429	700	12.3	3.05	3.06	18,800	16,756	2,000	12.0
Winkler	3,500	3,411	100	3.1	2.99	2.90	10,600	9,944	600	6.5
Wise	11,200	9,411	1,800	19.5	2.86	2.80	32,400	26,575	5,900	22.1
Wood	10,500	9,242	1,200	13.1	2.54	2.56	27,700	24,697	3,000	12.2
Yoakum	3,100	2,700	400	16.6	3.06	3.05	9,700	8,299	1,400	16.7
Young	7,300	7,361	-	-0.5	2.55	2.54	19,100	19,083	-	-0.1
Zapata	2,700	2,059	600	29.9	3.12	3.22	8,300	6,628	1,700	25.8
Zavala	3,100	3,068	100	2.6	3.78	3.80	11,900	11,666	200	1.9
Utah	505,000	448,603	57,000	12.7	3.20	3.20	1,645,000	1,461,037	184,000	12.6
Beaver	1,700	1,428	200	17.1	3.10	3.06	5,200	4,378	800	18.6
Box Elder	10,300	9,808	500	5.2	3.44	3.31	36,300	33,222	3,000	9.2
Cache	19,700	17,558	2,100	11.9	3.18	3.16	64,600	57,176	7,500	13.1
Carbon	7,200	7,242	-100	-1.3	3.13	3.03	22,600	22,179	400	2.0
Daggett	200	244	-	1.8	3.11	3.15	800	769	-	0.4
Davis	47,200	39,994	7,200	17.9	3.64	3.58	175,100	146,540	28,600	19.5
Duchesne	4,400	3,499	900	26.9	3.42	3.57	15,300	12,565	2,700	21.6
Emery	3,300	3,276	-	0.6	3.65	3.48	12,100	11,451	600	5.3
Garfield	1,300	1,196	100	6.8	3.08	3.00	4,000	3,673	300	9.4
Grand	2,500	2,759	-300	-9.5	2.94	2.98	7,300	8,241	-900	-10.9
Iron	5,900	5,168	800	14.7	3.23	3.28	19,800	17,349	2,400	13.9
Juab	1,800	1,707	100	7.3	3.29	3.21	6,100	5,530	600	10.0
Kane	1,500	1,286	200	15.5	3.10	3.12	4,600	4,024	600	14.8
Millard	4,200	2,728	1,500	55.5	3.38	3.28	14,400	8,970	5,400	60.5
Morgan	1,300	1,355	-	-1.1	3.82	3.63	5,100	4,917	200	4.0
Piute	500	435	-	3.7	3.21	3.06	1,400	1,329	100	9.0
Rich	700	654	-	5.6	3.37	3.21	2,300	2,100	200	11.0
Salt Lake	227,400	201,742	25,700	12.7	3.01	3.03	692,700	619,066	73,700	11.9
San Juan	2,700	3,018	-300	-9.7	4.24	4.04	11,600	12,253	-600	-5.3
Sanpete	4,800	4,454	400	8.4	3.34	3.17	16,700	14,620	2,100	14.0
Sevier	4,900	4,587	300	5.8	3.21	3.19	15,700	14,727	1,000	6.7
Summit	4,100	3,381	700	21.2	3.04	3.02	12,400	10,198	2,200	22.0
Tooele	8,800	7,966	800	10.4	3.29	3.23	29,200	26,033	3,200	12.3
Uintah	7,200	5,949	1,200	20.8	3.49	3.44	25,100	20,506	4,600	22.3
Utah	65,400	58,515	6,800	11.7	3.53	3.59	240,100	218,106	22,000	10.1
Wasatch	2,900	2,595	300	13.3	3.28	3.26	9,700	8,523	1,200	13.8
Washington	10,500	7,801	2,700	34.1	3.29	3.28	35,200	26,065	9,200	35.1
Wayne	700	615	-	6.2	3.27	3.11	2,100	1,911	200	11.7
Weber	52,500	47,643	4,900	10.2	2.96	2.99	157,400	144,616	12,800	8.9
Vermont	196,000	178,325	18,000	10.1	2.62	2.75	535,000	511,456	24,000	4.6
Addison	10,400	9,380	1,000	11.2	2.79	2.91	31,400	29,406	2,000	6.9

Reference 4

PREFACE

U.S. DEPARTMENT OF COMMERCE

Luther H. Hodges, Secretary

WEATHER BUREAU

F.W. Reichelderfer, Chief

Reference 4

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by

DAVID M. HERSHFIELD

Cooperative Studies Section, Hydrologic Services Division

for

Engineering Division, Soil Conservation Service

U.S. Department of Agriculture

THIS ATLAS IS OBSOLETE FOR THE FOLLOWING 11 WESTERN STATES: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

NOAA ATLAS 2: PRECIPITATION-FREQUENCY ATLAS OF THE WESTERN UNITED STATES (GPO: 11 Vols., 1973) supersedes the Technical Paper 40 data for these states.

All but 3 of the 11 state volumes are out of print, and no reprint is presently planned.

Institutions in the eleven western states likely to have copies of these volumes for their state for public inspection are:

- US Department of Agriculture Soil Conservation Service Offices
- US Army Corps of Engineers Offices
- Selected University Libraries
- National Weather Service Offices (may also have volumes for adjacent states).
- National Weather Service Forecast Offices (may have all eleven volumes)

Elsewhere, libraries of universities where hydrology and meteorology degree programs are offered may shelve some of the eleven volumes.

The three volumes in print as of 1 Jan 1983 at the GPO are:

Vol	State	GPO Stock Number	Price
IV	New Mexico	003-017-00158-0	$10.00
VI	Utah	003-017-00160-1	12.00
VII	Nevada	003-017-00161-0	9.50

The GPO Order number is 202-783 3238 for VISA and MASTERCARD orders which

NOTICE

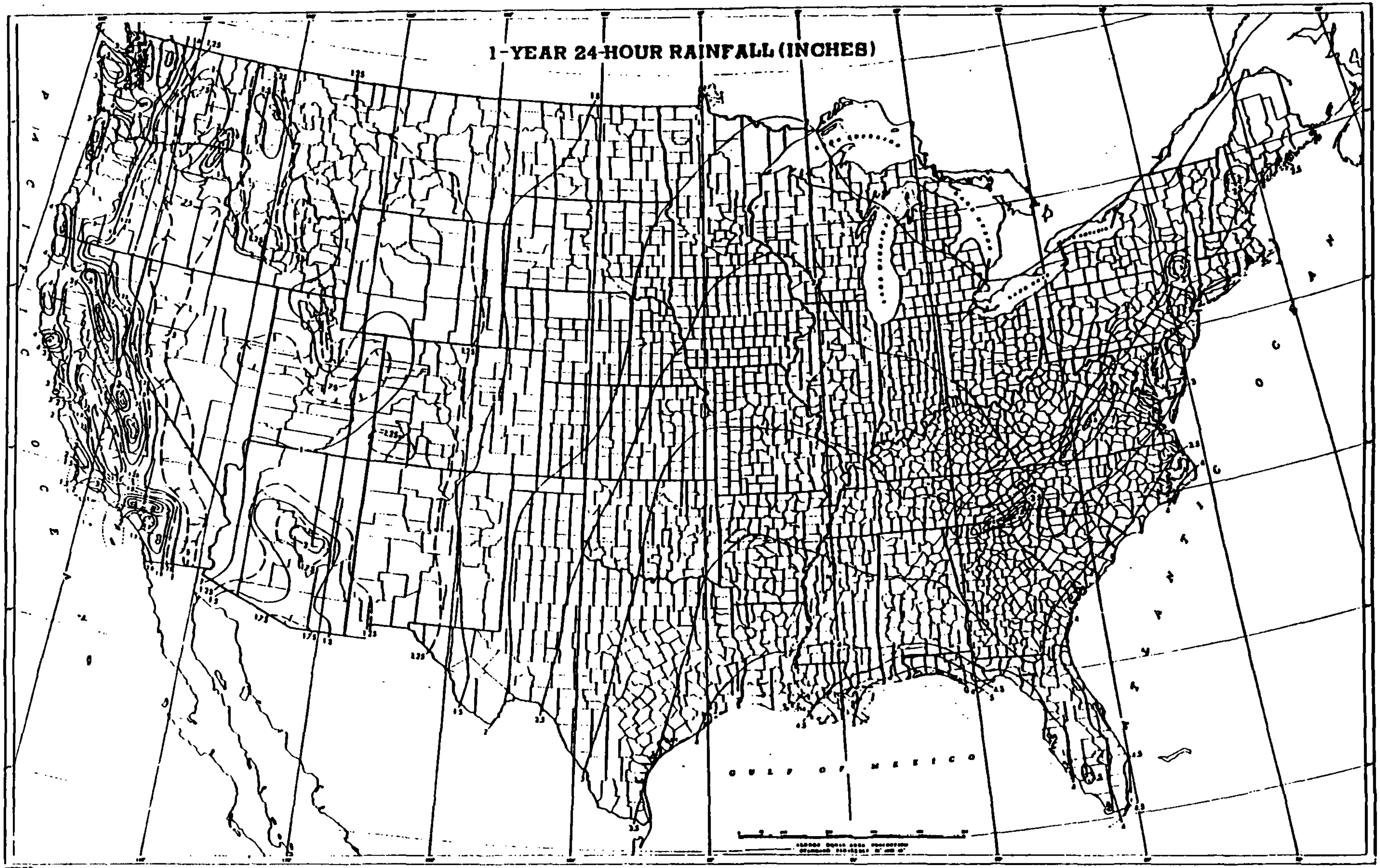
Rainfall-frequency information for durations of 1 hour and less for the Central and Eastern States has been superseded by NOAA Technical Memorandum NWS HYDRO-35 Five to Sixty-Minute Precipitation Frequency for the Eastern and Central United States. This publication (Accession No. PB 272-112/AS) is obtainable from:

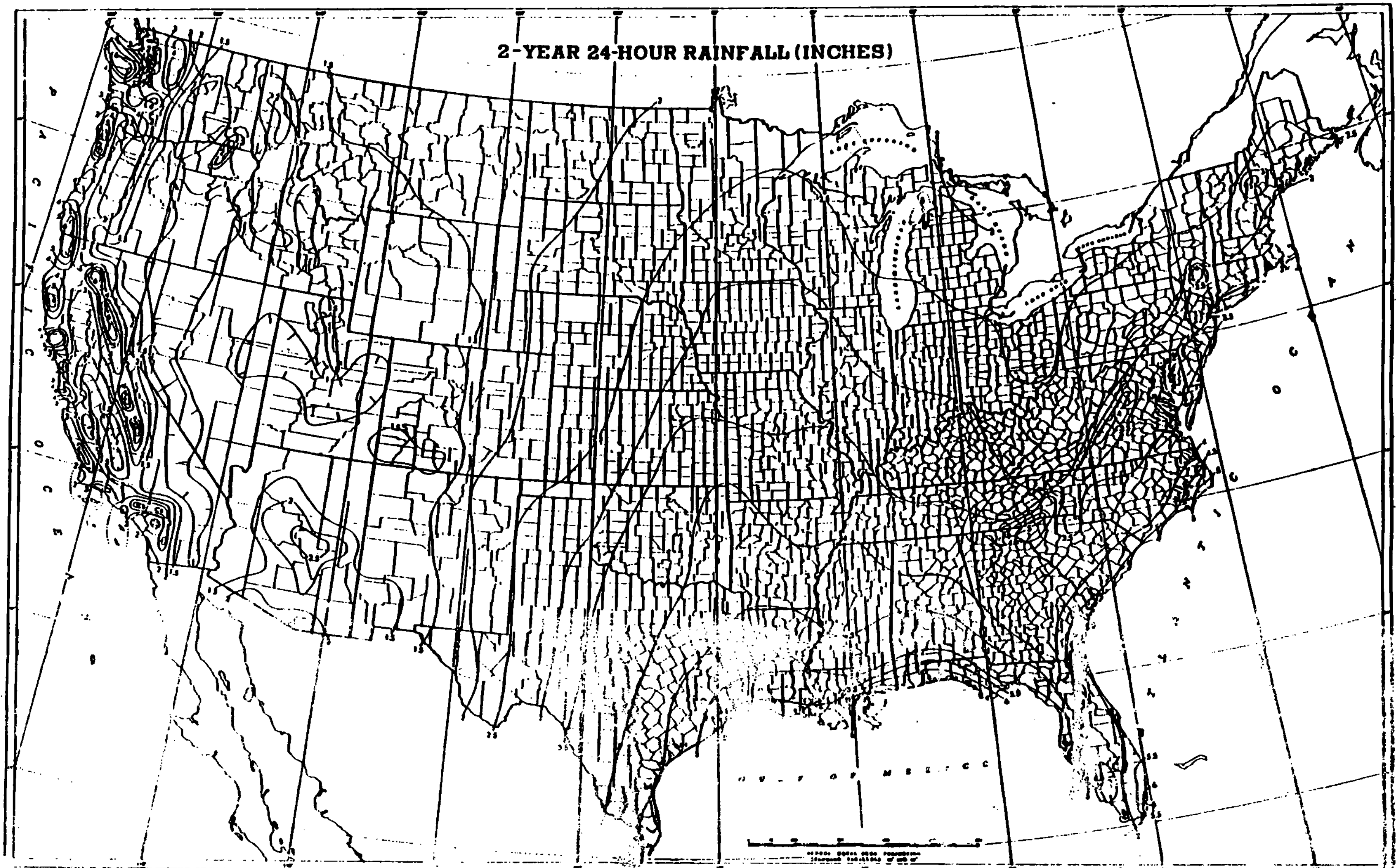
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

WASHINGTON, D.C.

May 1961

Chart, 48





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Reference 5

DW0550 TEXAS WATER COMMISSION 05-23-89

NOTICE OF REGISTRATION

SOLID WASTE MANAGEMENT

THIS IS NOT A PERMIT AND DOES NOT CONSTITUTE AUTHORIZATION OF ANY WASTE MANAGEMENT ACTIVITIES OR FACILITIES LISTED BELOW. REQUIREMENTS FOR SOLID WASTE MANAGEMENT ARE PROVIDED BY TEXAS ADMINISTRATIVE CODE SECTION 335 OF THE RULES OF THE TEXAS WATER COMMISSION (TWC). CHANGES OR ADDITIONS TO WASTE MANAGEMENT METHODS REFERRED TO IN THIS NOTICE REQUIRE WRITTEN NOTIFICATION TO THE TWC.

DATE OF NOTICE: 05-12-89 REGISTRATION DATE: 12-14-79

REGISTRATION NUMBER: 31631 EPA I.D. NUMBER: TXD097311849

THE REGISTRATION NUMBER PROVIDES ACCESS TO STORED INFORMATION PERTAINING TO YOUR OPERATION. PLEASE REFER TO THAT NUMBER IN ANY CORRESPONDENCE.

COMPANY NAME: HOUSTON LIGHTING & POWER CO.
MAILING ADDRESS: W.A.PARISH GENERATING STATION
P O BOX 1700 - W.F.MCGUIRE
HOUSTON, TEXAS 77001
GENERATING SITE LOCATION:
Y U JONES ROAD, THOMPSONS, TX
CONTACT PERSON: W F MCGUIRE
PHONE: (713) 922-2186
NUMBER OF EMPLOYEES: GREATER THAN 100
TWC DISTRICT: 07

REGISTRATION STATUS: ACTIVE
REGISTRATION TYPE: GENERATOR
HAZARDOUS WASTE STATUS:
GENERATOR

I. WASTE GENERATED:

WASTE NUMBER	DESCRIPTION	CLASS	CODE	DISPOSITION
001	OIL, WASTE	I	110450	ON-SITE/OFF-SITE/SOLD FOR RECOVERY
002	INORGANIC SLUDGE	II	240540	ON-SITE
003	CONSTRUCTION DEBRIS AND NON-COMBUSTIBLE WASTE	III	370510	ON-SITE
004	ASH, BOILER	II	270270	ON-SITE / SOLD FOR RECOVERY
005	PCB CONTAMINATED SOLIDS	I	179430	ON-SITE/OFF-SITE

006	ASBESTOS	I	170750	ON-SITE/OFF-SITE
007	BRICK, REFRACTORY (SPENT)	I	170300	ON-SITE/OFF-SITE
008	SOLVENTS, SPENT	IH	910100	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D001, F001, F003, F005			
009	PAINT THINNER	IH	910110	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): F003, F005			
010	WASTEWATER,DEMINERALIZER ACID REGENERATION	IH	902570	ON-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D002			
011	WASTEWATER,DEMINERALIZER BASE REGENERATION	IH	902560	ON-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D002			
012	PAINT, DRY	IH	979740	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D001, F003, F005			
013	METAL CLEANING WASTE, INORGANI C	IH	903070	ON-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D002			
014	DIESEL CONTAMINATED MATERIAL	IH	977750	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D001			
015	METAL CLEANING WASTE, ORGANIC	II	215290	ON-SITE/SECONDARY US E
016	ORGANIC CONTAINING SLUDGE	II	248990	ON-SITE
017	OIL, WASTE	II	210450	ON-SITE/OFF-SITE/SOL D FOR RECOVERY
018	OIL CONTAMINATED SOLIDS	II	283230	ON-SITE/OFF-SITE
019	OIL CONTAMINATED SOLIDS	I	183230	ON-SITE/OFF-SITE
020	ASH, FLY, MIXED WITH SCRUBBER	II	272250	ON-SITE / SOLD FOR R

2

	SLUDGE			ECOVERY
021	PCB CAPACITOR	I	173880	ON-SITE/OFF-SITE
022	POLYMER, WATER TREATING	I	184740	NO LONGER GENERATED
023	PAINT WASTE, LIQUID	IH	910650	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D008, D001, F003, F005			
024	SANDBLASTING GRIT	IH	973280	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D008			
025	MERCURY CONTAMINATED SOLID	IH	978850	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D009			
026	PAINT STRIPPER	IH	916510	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D002			
027	GREASE	II	280440	ON-SITE/OFF-SITE
028	GREASE	I	180440	ON-SITE/OFF-SITE
029	OIL, HYDRAULIC	I	110480	NO LONGER GENERATED
030	TANK BOTTOMS, FUEL OIL	I	152920	OFF-SITE/SECONDARY U SE
031	DUST, FLUE	II	271430	ON-SITE
032	DEMINERALIZER RESIN BEADS, SPE NT	II	270131	ON-SITE
033	SANDBLASTING GRIT	II	273280	ON-SITE/OFF-SITE
034	ACETONE AND RESIN	IH	917240	ON-SITE/OFF-SITE
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): F001			
035	WATER TREATMENT SLUDGE	II	240150	ON-SITE
036	ACID CONTAMINATED MATERIAL	IH	979290	NO LONGER GENERATED
	EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS):			
037	SODIUM HYDROXIDE CONTAMINATED MATERIAL	IH	976330	ON-SITE/OFF-SITE

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D002

038	ACID CONTAMINATED MATERIAL	IH	979290	ON-SITE/OFF-SITE

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D002

039	DIESEL	IH	912900	ON-SITE/OFF-SITE

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D001

040	OIL, CUTTING, WATER SOLUBLE	I	109710	ON-SITE/OFF-SITE
041	ASPHALT	IH	980370	ON-SITE/OFF-SITE

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D001

042	GASOLINE AND WATER	IH	918380	ON-SITE/OFF-SITE

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D001

043	ANTIFREEZE	I	108320	ON-SITE/OFF-SITE
044	HYDRAZINE	IH	902640	ON-SITE/OFF-SITE

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): U133

045	PHOSPHATES, ORGANIC	I	119000	ON-SITE/OFF-SITE
046	ISOPROPANOL MIXTURE	IH	914280	ON-SITE/OFF-SITE

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D001

047	PHOSPHATES, INORGANIC	I	175240	ON-SITE/OFF-SITE
048	DIESEL CONTAMINATED MATERIAL	I	177750	ON-SITE/OFF-SITE
049	CLEANING SOLUTION	IH	903860	ON-SITE/OFF-SITE

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS): D002

050	PLANT REFUSE, GENERAL MISC.	II	279760	ON-SITE/OFF-SITE
051	CONSTRUCTION DEBRIS	II	273630	ON-SITE/OFF-SITE
052	CONTAINERS, TRIPLE RINSED AND UNUSABLE	II	270504	ON-SITE/OFF-SITE

053 D001 CHARACTERISTIC OF IGNITA BILITY IH 990001 OFF-SITE/SOLD FOR RECOVERY

EPA HAZARDOUS WASTE NOS. (REFER TO 40 CFR PART 261 FOR DESCRIPTIONS):

II. Shipping/Reporting: Pursuant to Section 335 of the Texas Administrative Code of the rules of the TWC pertaining to Hazardous Waste management, issuance of manifests and annual reporting are required for Off-site Storage/Processing/Disposal of the following wastes listed in Part I. All manifested wastes should be reported on the annual waste summary report and submitted to the TWC by the 25th of each January for the prior calendar year.

In addition for any of the following waste(s) manifested and shipped to Storage/Processing/Disposal facilities in any other state a waste shipment summary is required. All such shipments should be reported on the waste shipment summary report and submitted to the TWC no later than the 25th day of the month immediately succeeding the month in which the shipment was made. No waste shipment summary report is required for months when out of state shipments are not made.

001	110450	OIL, WASTE
005	179430	PCB CONTAMINATED SOLIDS
006	170750	ASBESTOS
007	170300	BRICK, REFRACTORY (SPENT)
008	910100	SOLVENTS, SPENT
009	910110	PAINT THINNER
012	979740	PAINT, DRY
014	977750	DIESEL CONTAMINATED MATERIAL
019	183230	OIL CONTAMINATED SOLIDS
021	173880	PCB CAPACITOR
023	910650	PAINT WASTE, LIQUID
024	973280	SANDBLASTING GRIT
025	978850	MERCURY CONTAMINATED SOLID
026	916510	PAINT STRIPPER
028	180440	GREASE
030	152920	TANK BOTTOMS, FUEL OIL
034	917240	ACETONE AND RESIN

037	976330	SODIUM HYDROXIDE CONTAMINATED MATERIAL
038	979290	ACID CONTAMINATED MATERIAL
039	912900	DIESEL
040	109710	OIL, CUTTING, WATER SOLUBLE
041	980370	ASPHALT
042	918380	GASOLINE AND WATER
043	108320	ANTIFREEZE
044	902640	HYDRAZINE
045	119000	PHOSPHATES, ORGANIC
046	914280	ISOPROPANOL MIXTURE
047	175240	PHOSPHATES, INORGANIC
048	177750	DIESEL CONTAMINATED MATERIAL
049	903860	CLEANING SOLUTION
053	990001	D001 CHARACTERISTIC OF IGNITA BILITY

III. ON-SITE WASTE MANAGEMENT FACILITIES:

FAC NO.	FACILITY	STATUS
01	LANDFILL STORAGE AND/OR DISPOSAL OF WASTE NUMBER(S) 002, 004, 016, 020, 031, 032, 035	ACTIVE
02	LANDFILL DISPOSAL OF WASTE NUMBER(S) 003	ACTIVE
03	CONTAINER STORAGE AREA STORAGE FOR LESS THAN 90 DAYS OF WASTE NUMBER(S) 005, 021	ACTIVE
04	BOILER OR INDUSTRIAL FURNACE (ENERGY PRODUC PROCESSING/DISPOSAL OF WASTE NUMBER(S) 015	ACTIVE

05 MISCELLANEOUS STORAGE CONTAINERS ACTIVE
STORAGE FOR LESS THAN 90 DAYS
OF WASTE NUMBER(S) 001, 006, 007, 008, 009, 012,
014, 017, 018, 019, 023, 024,
025, 026, 027, 028, 029, 033,
034, 037, 038, 039, 040, 041,
042, 043, 044, 045, 046, 047,
048, 049

06 TANK (SURFACE) ACTIVE
PROCESSING
OF WASTE NUMBER(S) 010, 011, 013
CLARIFICATION & NEUTRALIZATION
PERMITTED EFFLUENT TREATMENT UNIT

07 TANK (SURFACE) ACTIVE
PROCESSING
OF WASTE NUMBER(S) 010, 011, 013
CLARIFICATION & NEUTRALIZATION
PERMITTED EFFLUENT TREATMENT UNIT

08 CONTAINER STORAGE AREA ACTIVE
STORAGE
OF WASTE NUMBER(S) 050, 051, 052
DUMPSTERS

UNLESS OTHERWISE STATED ABOVE, FACILITIES ARE LOCATED
AT Y U JONES ROAD, THOMPSONS, TX
COUNTY OF FORT BEND

IV. RECORDS.

A. FOR PURPOSES OF FILING ANNUAL REPORTS PURSUANT TO TEXAS ADMINISTRATIVE CODE SECTION 335 OF THE RULES OF THE TWC PERTAINING TO INDUSTRIAL SOLID WASTE MANAGEMENT, RECORDS SHOULD BE MAINTAINED FOR STORAGE, PROCESSING AND/OR DISPOSAL OF THE FOLLOWING WASTE(S) LISTED IN PART I:

001 110450 OIL, WASTE

005 179430 PCB CONTAMINATED SOLIDS

006 170750 ASBESTOS

007 170300 BRICK, REFRACTORY (SPENT)

008 910100 SOLVENTS, SPENT

009 910110 PAINT THINNER

010 902570 WASTEWATER,DEMINERALIZER ACID REGENERATION

011 902560 WASTEWATER,DEMINERALIZER BASE

REGENERATION

012 979740 PAINT, DRY

013 903070 METAL CLEANING WASTE, INORGANIC

014 977750 DIESEL CONTAMINATED MATERIAL

019 183230 OIL CONTAMINATED SOLIDS

021 173880 PCB CAPACITOR

023 910650 PAINT WASTE, LIQUID

024 973280 SANDBLASTING GRIT

025 978850 MERCURY CONTAMINATED SOLID

026 916510 PAINT STRIPPER

028 180440 GREASE

034 917240 ACETONE AND RESIN

037 976330 SODIUM HYDROXIDE CONTAMINATED MATERIAL

038 979290 ACID CONTAMINATED MATERIAL

039 912900 DIESEL

040 109710 OIL, CUTTING, WATER SOLUBLE

041 980370 ASPHALT

042 918380 GASOLINE AND WATER

043 108320 ANTIFREEZE

044 902640 HYDRAZINE

045 119000 PHOSPHATES, ORGANIC

046 914280 ISOPROPANOL MIXTURE

047 175240 PHOSPHATES, INORGANIC

048 177750 DIESEL CONTAMINATED MATERIAL

049 903860 CLEANING SOLUTION

B. PROOF OF RECORDATION IN THE COUNTY DEED RECORDS, AS REQUIRED BY TEXAS ADMINISTRATIVE CODE SECTION 335 OF THE RULES OF THE TDWR, SHOULD BE SUBMITTED TO THE EXECUTIVE DIRECTOR FOR THE FOLLOWING FACILITIES LISTED IN PART III IN ACCORDANCE WITH THE FOLLOWING SCHEDULES:

NEW FACILITIES - PRIOR TO INITIATION OF DISPOSAL OPERATIONS.

EXISTING FACILITIES - AS SOON AS POSSIBLE, BUT NO LATER THAN SIXTY (60) DAYS FROM THE DATE OF THIS NOTICE, UNLESS PREVIOUSLY SUBMITTED.

FAC NO	FACILITY
01	LANDFILL
02	LANDFILL

Reference 6

31631

The Light company Houston Lighting & Power P.O. Box 1700 Houston, Texas 77001 (713) 228-9211

October 9, 1984

Received October 15, 1984
Solid Waste Section

Ray Henry Austin, Head
Storage and Processing Facilities Unit
Solid Waste Section
Texas Department of Water Resources
P. O. Box 13087, Capitol Station
Austin, Texas 78711

Dear Mr. Austin:

SUBJECT: REVISED PART A APPLICATION
W. A. PARISH GENERATING STATION - TDWR No. 31631

RECEIVED
NOV 16 1984
PERMITS CONTROL
TDWR

The August 1980 Part A application for Houston Lighting & Power Company's W. A. Parish Generating Station has been updated. The attached revisions reflect current hazardous waste management practices at this facility.

Please call R. D. Groover at (713) 922-2195 if you have any questions concerning these revisions.

add 933280
D008

Sincerely,

W. F. McGuire, Manager
Environmental Protection Department

BP/bwt

Attachments

cc: M. J. Coloton, TDWR District 7

Revised Part A Application
W. A. Parish Generating Station

The Part A application prepared in August 1980 listed several wastes/ facility components which have been removed in the revised Part A. These wastes/components are discussed below:

1. Demineralizer Regenerant Inorganic Sludge

   This sludge accumulates at the bottom of concrete tanks which store low volume wastes including demineralizer regenerant. Based on EP toxicity analyses submitted to your office on April 8, 1981 (letter attached), this waste has been declassified to a Class II waste (TWC 241470).

2. Metal Cleaning Inorganic Sludge

   This sludge accumulates at the bottom of concrete tanks which store inorganic wastes including hydrochloric acid boiler and equipment cleaning wastes. Based on EP toxicity analyses submitted to your office on April 8, 1981 (letter attached), this waste has been declassified to a Class II waste (TWC 241210).

3. Metal Cleaning Organic Acids/Metal Cleaning Organic Acids Collection Tanks

   This waste is generated from ammoniated citric acid or hydroxyacetic-formic acid boiler and equipment cleanings. It is stored in concrete tanks prior to being injected in an energy-producing boiler for incineration. Based on EP toxicity analyses submitted to your office on April 8, 1981 (letter attached), this waste has been declassified to a Class II waste (TWC 215290).

4. Metal Cleaning Organic Sludge

   This sludge accumulates at the bottom of concrete tanks which store organic acids. Based on EP toxicity analyses submitted to your office on April 8, 1981 (letter attached), this waste has been declassified to a Class II waste (TWC 248990).

5. Chemical Waste Treatment System Sludge/Chemical Waste Treatment Systems & Ash Disposal Area

   Concrete chemical waste treatment systems are used to treat demineralizer regenerant and inorganic metal cleaning waste (when generated) prior to NPDES discharge. The sludge which accumulates in the settling chamber of the treatment systems is pumped to the sludge handling system prior to disposal in the ash disposal area (listed as Facility Number 01, Lagoon/Pond, under Part III of Notice of Registration). Based on EP toxicity analyses submitted to your office on February 23, 1981 (letter attached), this sludge has been declassified to a Class II waste (TWC 240540).

6. Waste Oil and Sludge/Waste Oil and Sludge Collection Facilities

Oily sludge generated from the oily waste treatment systems is classified as a Class I nonhazardous or Class II waste, depending on the amount of oil present in the sludge. The attached EP toxicity analyses of oily sludge indicate that no hazardous constituents are present.

7. Asbestos In Insulation

Insulation containing asbestos is classified as a Class I nonhazardous waste (TWC 170750). Asbestos, originally listed on the Part A application, is not an EPA listed hazardous waste.

8. Inorganic Acids Collection Ponds

The three inorganic impoundments identified in Table III-2 and Table III-4 of the August 1980 Part A application were excavated in 1977 for temporary use during construction of Units 5 & 6. On an intermittent basis, the impoundments collected boiler blowdown and inorganic metal cleaning waste from pre-operational cleanings of Units 5 & 6. These wastes were then transferred to Units 5 & 6 concrete tank wastewater treatment system for treatment prior to NPDES discharge. Hazardous waste entered the impoundments on four separate occasions during pre-operational cleanings, the last event being an inorganic metal cleaning in September 1978.

No wastewater entered the three impoundments after early 1980. The above-ground piping to the impoundments was removed during construction of Units 7 & 8 wastewater treatment system which was in service by June 1980. By March 1982, all three impoundments had been filled in and graded over. No dirt was removed from the impoundments during this activity.

The following pages of the Part A application have been revised to reflect current hazardous waste management practices at the W. A. Parish Generating Station.

Table III-I Generated Hazardous Wastes and Management Activities

Verbal Description of Waste	TDWR Sequence Number	TDWR Waste Code Number	EPA Hazard Code	EPA Hazardous Waste No.	Waste Management Activities (Check applicable items): Off-Site Disposal	On-Site: Storage[1]	On-Site: Processing[2]	On-Site: Disposal	Estimated 1983 Annual Quantity Generated (lbs)	SIC Code and Process
Demineralizer Acid and Base Regeneration Wastewater	010 011	902570 902560	C	D002		X	X		2.1×10^{9}*	4911 - Water Treatment
Inorganic Metal Cleaning Waste	013	903070	C	D002		X	X		7.5×10^{5}	4911 - Boiler & Condenser Cl[illegible]in[illegible]
Spent Solvents	008	910100	I	D001	X	X	X		4.0×10^{4}	4911 - Degreasing
Paint Thinner	009	910110	I,T	D001 F003,F005	X	X			2.6×10^{3}	4911 - Painting
Blasting Material Contaminated with Lead		973280	E	D008	X	X			7.8×10^{5}**	4911 - Painting

* Total quantity discharged from low volume waste tanks under NPDES permit.

** Anticipated 1984 annual quantity generated (lbs).

1 "Storage" means the interim containment or control of waste after generation and prior to ultimate disposal.

2 "Processing" means the extraction of materials, transfer, volume reduction, conversion to energy, or other separation and preparation of solid waste for reuse or disposal, including the treatment or neutralization of hazardous waste so as to render such waste nonhazardous, safer for transport, amenable for recovery, amenable for storage, or reduced volume. The "transfer" of solid waste for reuse or disposal as used above, does not include the actions of a carrier in conveying or transporting solid waste by truck, ship, pipeline, or other means.

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: Demineralizer Acid and Base Regeneration Wastewater

Process (see last column in Table III-1): Water Treatment

TDWR Sequence Number of Waste (if assigned): 010, 011

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___ Lagoon/Pond (unlined)
___ Lagoon/Pond (lined)
___ Basin (earthen, above-grade lined)
___ Basin (earthen, above-grade unlined)
___ Basin (earthen, below-grade lined)
___ Basin (earthen, below-grade unlined)
___ Basin (concrete, above-grade lined)
___ Basin (concrete, above-grade unlined)
___ Basin (concrete, below-grade lined)
___ Basin (concrete, below-grade unlined)
___ Basin (other)
___ Pit (lined)
___ Pit (unlined)
___ Incinerator
___ Open Controlled Incineration Area
___ Boiler (energy-producing)
___ Landfill (sanitary)
___ Landfill (surface, open)
___ Landfill (other)

___ Landfarm
___ Landspreading Area
___ Spray Irrigation Area
___ Flood Irrigation Area
___ Septic Tank/Drain Field
___ Injection Well
*2 Tank (surface storage)
*1 Tank (sub-surface storage)
___ Tank (surface processing)
___ Tank (sub-surface processing)
___ Tank (other)
___ Drum Storage Area (open)
___ Drum Storage Area (enclosed)
___ Drum Storage Area (other)
___ Bulk Storage Area (open)
___ Bulk Storage Area (enclosed)
___ Bulk Storage Area (other)
___ Other (specify ___________)

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* Part of wastewater treatment unit

5

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Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: Inorganic Metal Cleaning Waste

Process (see last column in Table III-1): Boiler & Condenser Cleaning

TDWR Sequence Number of Waste (if assigned): 013

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___	Lagoon/Pond (unlined)	___	Landfarm
___	Lagoon/Pond (lined)	___	Landspreading Area
___	Basin (earthen, above-grade lined)	___	Spray Irrigation Area
___	Basin (earthen, above-grade unlined)	___	Flood Irrigation Area
___	Basin (earthen, below-grade lined)	___	Septic Tank/Drain Field
___	Basin (earthen, below-grade unlined)	___	Injection Well
___	Basin (concrete, above-grade lined)	*2	Tank (surface storage)
___	Basin (concrete, above-grade unlined)	*2	Tank (sub-surface storage)
___	Basin (concrete, below-grade lined)	___	Tank (surface processing)
___	Basin (concrete, below-grade unlined)	___	Tank (sub-surface processing)
___	Basin (other)	___	Tank (other)
___	Pit (lined)	___	Drum Storage Area (open)
___	Pit (unlined)	___	Drum Storage Area (enclosed)
___	Incinerator	___	Drum Storage Area (other)
___	Open Controlled Incineration Area	___	Bulk Storage Area (open)
___	Boiler (energy-producing)	___	Bulk Storage Area (enclosed)
___	Landfill (sanitary)	___	Bulk Storage Area (other)
___	Landfill (surface, open)	___	Other (specify ___________
___	Landfill (other)		___________________________)

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* Part of wastewater treatment unit

6

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Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: Spent Solvents

Process (see last column in Table III-I): Degreasing

TDWR Sequence Number of Waste (if assigned): 008

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___	Lagoon/Pond (unlined)	___	Landfarm
___	Lagoon/Pond (lined)	___	Landspreading Area
___	Basin (earthen, above-grade lined)	___	Spray Irrigation Area
___	Basin (earthen, above-grade unlined)	___	Flood Irrigation Area
___	Basin (earthen, below-grade lined)	___	Septic Tank/Drain Field
___	Basin (earthen, below-grade unlined)	___	Injection Well
___	Basin (concrete, above-grade lined)	___	Tank (surface storage)
___	Basin (concrete, above-grade unlined)	___	Tank (sub-surface storage)
___	Basin (concrete, below-grade lined)	___	Tank (surface processing)
___	Basin (concrete, below-grade unlined)	___	Tank (sub-surface processing)
___	Basin (other)	___	Tank (other)
___	Pit (lined)	1	Drum Storage Area (open)
___	Pit (unlined)	1	Drum Storage Area (enclosed)
___	Incinerator	___	Drum Storage Area (other)
___	Open Controlled Incineration Area	___	Bulk Storage Area (open)
3	Boiler (energy-producing)	___	Bulk Storage Area (enclosed)
___	Landfill (sanitary)	___	Bulk Storage Area (other)
___	Landfill (surface, open)	X	Other (specify Mixed with waste oil for pickup by a waste oil recycling firm)
___	Landfill (other)		

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1

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste	Paint Thinner
Process (see last column in Table III-1)	Painting
TDWR Sequence Number of Waste (if assigned)	009

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___	Lagoon/Pond (unlined)	___	Landfarm
___	Lagoon/Pond (lined)	___	Landspreading Area
___	Basin (earthen, above-grade lined)	___	Spray Irrigation Area
___	Basin (earthen, above-grade unlined)	___	Flood Irrigation Area
___	Basin (earthen, below-grade lined)	___	Septic Tank/Drain Field
___	Basin (earthen, below-grade unlined)	___	Injection Well
___	Basin (concrete, above-grade lined)	___	Tank (surface storage)
___	Basin (concrete, above-grade unlined)	___	Tank (sub-surface storage)
___	Basin (concrete, below-grade lined)	___	Tank (surface processing)
___	Basin (concrete, below-grade unlined)	___	Tank (sub-surface processing)
___	Basin (other)	___	Tank (other)
___	Pit (lined)	1	Drum Storage Area (open)
___	Pit (unlined)	1	Drum Storage Area (enclosed)
___	Incinerator	___	Drum Storage Area (other)
___	Open Controlled Incineration Area	___	Bulk Storage Area (open)
___	Boiler (energy-producing)	___	Bulk Storage Area (enclosed)
___	Landfill (sanitary)	___	Bulk Storage Area (other)
___	Landfill (surface, open)	___	Other (specify ______________)
___	Landfill (other)		

8

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: Blasting Material Contaminated With Lead

Process (see last column in Table III-1): Painting

TDWR Sequence Number of Waste (if assigned) ____________

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___ Lagoon/Pond (unlined)

___ Lagoon/Pond (lined)

___ Basin (earthen, above-grade lined)

___ Basin (earthen, above-grade unlined)

___ Basin (earthen, below-grade lined)

___ Basin (earthen, below-grade unlined)

___ Basin (concrete, above-grade lined)

___ Basin (concrete, above-grade unlined)

___ Basin (concrete, below-grade lined)

___ Basin (concrete, below-grade unlined)

___ Basin (other)

___ Pit (lined)

___ Pit (unlined)

___ Incinerator

___ Open Controlled Incineration Area

___ Boiler (energy-producing)

___ Landfill (sanitary)

___ Landfill (surface, open)

___ Landfill (other)

___ Landfarm

___ Landspreading Area

___ Spray Irrigation Area

___ Flood Irrigation Area

___ Septic Tank/Drain Field

___ Injection Well

___ Tank (surface storage)

___ Tank (sub-surface storage)

___ Tank (surface processing)

___ Tank (sub-surface processing)

___ Tank (other)

___ Drum Storage Area (open)

___ Drum Storage Area (enclosed)

___ Drum Storage Area (other)

___ Bulk Storage Area (open)

_X_ Bulk Storage Area (enclosed)

___ Bulk Storage Area (other)

___ Other (specify ____________)

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9

Table III-4 Hazardous Waste Facility Components List

Facility Component: Name	TDWR Seq. No.	Status: Inactive	Status: Active	Status: Proposed	Approximate Design Capacity (cu yds)	Approximate Design Capacity (gal)	Approximate Design Capacity (lbs)	Number of Years Utilized	Date in Service
Tank (surface storage)			X			2 compartments of 232,000 gal. ea.		6	1978
Verbal Description: Lined concrete tank for collection of low volume wastes, including demineralizer regeneration wastewater from Units 1-4 and Units 5 & 6, prior to treatment. Treated wastewater is discharged via NPDES permit.									
Tank (surface storage)			X			2 compartments of 196,000 gal. ea.		4	1980
Verbal Description: Lined concrete tank for collection of low volume wastes, including demineralizer regeneration wastewater from Units 7 & 8, prior to treatment. Treated wastewater is discharged via NPDES permit.									
Tank (sub-surface storage)			X			82,000		6	1978
Verbal Description: Lined concrete tank for collection of demineralizer regeneration wastewater from Units 1-4 prior to transfer to Units 5 & 6 low volume waste tank.									
Tank (surface storage)			X			2 compartments of 807,000 gal. ea.		6	1978
Verbal Description: Lined concrete tank for collection of inorganic wastes including inorganic metal cleaning wastes from Units 1-4 and Units 5 & 6, prior to treatment. Treated wastewater is discharged via NPDES permit.									
Tank (surface storage)			X			2 compartments of 1,189,000 gal. ea.		4	1980
Verbal Description: Lined concrete tank for collection of inorganic wastes including inorganic metal cleaning wastes from Units 7 & 8, prior to treatment. Treated wastewater is discharged via NPDES permit.									
Tank (sub-surface storage)			X			20,000 and 54,000		6	1978
Verbal Description: Two lined concrete tanks for collection of inorganic metal cleaning wastes from Units 1-4 prior to transfer to Units 5 & 6 inorganic metal cleaning waste tank.									

Note: All above facilities are part of wastewater treatment units.

10

W. A. Parish Generating Station

Table III-4 Hazardous Waste Facility Components List

Facility Component		Status			Design Capacity			Number of Years Utilized	Date in Service
Name	TDWR Seq. No.	Inactive	Active	Proposed	(cu yds)	(gal)	(lbs)		
Boiler (energy-producing)	04		X			NA		NA	NA
Verbal Description: Three boilers for incineration of spent solvents mixed with waste oil.									
Drum Storage (open)	05		X			NA		4	1980
Verbal Description: Drum storage area for waste paint thinner and spent solvents prior to off-site disposal.									
Drum Storage (enclosed)	05		X			NA		4	1980
Verbal Description: Drum storage area for waste paint thinner and spent solvents prior to off-site disposal.									
Bulk Storage Area (enclosed)			X			NA		1	1984
Verbal Description: Enclosed bins for storage of blasting material prior to off-site disposal.									
Verbal Description:									
Verbal Description:									

Attachment G
W. A. Parish Generating Station
Process Description for Hazardous Waste Streams

1. Demineralizer Acid and Base Regeneration Wastewater (EPA Hazard Code C)

Demineralizer regeneration wastewater is collected and treated in a series of concrete and metal tanks. The waste from Units 1-4 is collected in a concrete tank and then transferred to Units 5 & 6 concrete low volume waste tank where it mixes with demineralizer regenerant from Units 5 & 6. The waste from Units 7 & 8 is collected in Units 7 & 8 concrete low volume waste tank. Demineralizer regenerant is then pumped from each of the two low volume waste tanks to its respective chemical waste treatment system (metal tanks) for pH adjustment and suspended solids removal. Treated wastewater is discharge in accordance with the NPDES discharge.

2. Inorganic Metal Cleaning Waste (EPA Hazard Code C)

Inorganic metal cleaning waste is collected and treated in a series of concrete and metal tanks. The waste from Units 1-4 is collected in concrete tanks and then transferred to Units 5 & 6 concrete inorganic metal cleaning waste tank where it mixes with inorganic waste from Units 5 & 6. The waste from Units 7 & 8 is collected in Units 7 & 8 concrete inorganic metal cleaning waste tank. Inorganic metal cleaning waste is then pumped from each of the two inorganic metal cleaning waste tanks to its respective chemical waste treatment system (metal tanks) for pH adjustment, suspended solids and metals removal. Treated wastewater is discharged in accordance with the NPDES permit.

3. Spent Solvents (EPA Hazard Code I)

Spent solvents are collected in drums for off-site disposal, mixed with waste oil for recycling, or incinerated in an energy-producing boiler.

4. Paint Thinner (EPA Hazard Code I, T)

Paint thinner waste is collected in drums for temporary storage prior to off-site disposal.

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5. Blasting Material Contaminated With Lead (EPA Hazard Code E)

NOV 16 1984

Waste blasting material is collected in bins for temporary storage prior to off-site disposal.

TDWR

Houston Lighting & Power Company

Electric Tower
P.O. Box 1700
Houston, Texas 77001

April 8, 1981

Mr. Jay Snow
Solid Waste Section
Texas Department of Water Resources
P. O. Box 13087, Capitol Station
Austin, Texas 78711

Dear Mr. Snow:

SUBJECT: INDUSTRIAL SOLID WASTE RECLASSIFICATIONS

Pursuant to requirements set forth under RCRA, we have analyzed representative samples of the various waste streams and sludges generated at Houston Lighting & Power Company's generating stations. These waste streams and sludges were reported as being hazardous on our Part A, TDWR Hazardous Waste Registrations solely on the basis of Extraction Procedure (EP) Toxicity with the exception of metal cleaning inorganic acid waste, which was also listed on the basis of corrosivity, and demineralizer regenerant, which was listed only on the basis of corrosivity (See Attachment I).

The attached tables summarize the EP toxicity test results performed on each sample, including samples of demineralizer regenerant. The analyses were performed by our contract laboratory, Southern Petroleum Laboratories, and were done in accordance with the extraction procedures outlined by the EPA in Part 261, Appendix II of the Hazardous Waste Regulations. An attachment (Attachment II) has also been provided which identifies various abbreviations used in the summary tables to aid in your review.

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The EP toxicity analytical data does not indicate the presence of toxic components in concentrations greater than the EP toxicity test limits. Therefore, as a result of our testing, we feel that those wastes previously considered hazardous due to EP toxicity should be declassified from the hazardous waste category.

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It was stated above that two waste streams, demineralizer regenerant and metal cleaning inorganic acid wastes were listed as hazardous on the basis of corrosivity. The individual components that comprise each of these two waste streams when analyzed separately could result in pH values outside the specified range of the classification system. For example, if grab samples were taken of the cation and anion deminerlizer regeneration wastes, the cation wastes could exhibit low pH values, and the anion wastes could exhibit high pH values.

However, a composite sample of all the demineralizer regeneration wastes, due to neutralization of the wastes, would be classified as simply solid wastes since the pH would fall between 2 and 12.5 . The same type of example can be applied to metal cleaning inorganic acid waste as well, whereby the composite pH of the waste product would not qualify it as hazardous.

With respect to the corrosion of metals test to determine if a waste exhibits characteristics of corrosivity, many of the samples collected for EP toxicity analysis, including demineralizer regenerant and metal cleaning inorganic acid waste, were subjected to this test. The corrosivity analyses were performed in accordance with the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods." All samples indicated corrosion rates of less than 1 millimeter per year. This is substantially less than the 6.35 millimeter per year standard specified in the regulations.

It is also important to note that demineralizer regenerant and metal cleaning inorganic acid wastes are chemically treated and discharged under NPDES and TDWR wastewater discharge permits.

Considering the characteristics of demineralizer regenerant and metal cleaning inorganic acid waste described above and the corrosivity data, we do not feel that these two types of waste should be classified as hazardous waste prior to their treatment.

We therefore request declassification of all wastes specified in Attachment I. If you concur with our evaluation please notify us so that we can revise our Hazardous Waste Management program accordingly.

Sincerely,

W. F. McGuire

W. F. McGuire, Manager
Environmental Protection Department

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Attachments - I. Waste Listing
- II. Data Table Key
- III. EP Toxicity Data Tables (six)
- IV. Analytical Reports

ATTACHMENT I

HOUSTON LIGHTING & POWER COMPANY

WASTE LISTINGS

WASTE DESCRIPTION	BASIS for LISTING AS HAZARDOUS
Demineralizer Regenerant	C
Demineralizer Regenerant Inorganic Sludge	E
Metal Cleaning Inorganic Acids	EC
Metal Cleaning Inorganic Sludge	E
Metal Cleaning Organic Acids	E
Metal Cleaning Organic Sludge	E

C - Corrosive

E - E.P. Toxicity

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15

ATTACHMENT II

HOUSTON LIGHTING & POWER COMPANY

DATA TABLE KEY

PLANT NAME	PLANT ABBREVIATION	TDWR SOLID WASTE REGISTRATION NO.
S. R. BERTRON	SRB	31637
CEDAR BAYOU	CBY	31639
H. O. CLARKE	HOC	31635
DEEPWATER	DWP	31632
GREENS BAYOU	GBY	31634
W. A. PARISH	WAP	31631
P. H. ROBINSON	PHR	31638
WEBSTER	WEB	31633
T. H. WHARTON	THW	31636

For some of the waste sampled there exists more than one set of data. This is due to one of two reasons; 1) sample collections representing different dates; 2) sample collections representing more than one storage/treatment facility for that particular type of waste. These samples are denoted by their direction relative to one another (N,S,E,W) or by number notation.

ATTACHMENT III

EP TOXICITY DATA TABLES

Houston Lighting & Power Company
Hazardous Waste Management-Waste Analysis
Demineralizer Regenerant (Liquid)

EP Toxicity (ppm)	SRB	CBY	HOC	DWP	GBY	WAP	PHR	WEB	THW
Arsenic	<0.05	<0.05	<0.05	<0.05 (N) <0.05 (S)	<0.05	<0.05	<0.05	<0.05 <0.05	<0.05
Barium	<0.05	<0.05	<0.5	<0.5 <0.5	<0.05	<8.1	1.3	3.7 <0.05	9.5
Cadmium	<0.05	<0.05	<0.05	<0.05 <0.05	<0.05	<0.05	<0.05	<0.05 <0.05	0.07
Chromium	<0.05	<0.05	<0.05	<0.05 <0.05	<0.05	<0.05	<0.05	<0.05 <0.05	<0.05
Lead	<0.1	<0.1	<0.1	<0.1 <0.1	<0.1	<0.1	<0.1	<0.1 <0.1	<0.1
Mercury	<0.005	<0.005	<0.005	<0.005 <0.005	<0.005	<0.005	<0.005	<0.005 <0.005	<0.00
Selenium	<0.02	<0.02	<0.02	<0.02 <0.02	<0.02	<0.05	<0.05	<0.05 <0.02	<0.05
Silver	<0.05	<0.05	<0.05	<0.05 <0.05	<0.05	<0.05	<0.05	<0.05 <0.05	<0.05
Endrin	<0.02	<0.02	<0.02	<0.02 <0.02	<0.02	<0.02	<0.02	<0.02 <0.02	<0.02
Lindane	<0.4	<0.4	<0.4	<0.4 <0.4	<0.4	<0.4	<0.4	<0.4 <0.4	<0.4
Methoxychlor	<1	<1	<1	<1 <1	<1	<1	<1	<1 <1	<1
Toxaphene	<0.5	<0.5	<0.5	<0.5 <0.5	<0.5	<0.5	<0.5	<0.5 <0.5	<0.5
Dichlorophenoxyacetic	<1	<1	<1	<1 <1	<1	<1	<1	<1 <1	<1
Trichlorophenoxy[illegible]	<1	<1	<1	<1 <1	<1	<1	<1	<1 <1	<1

Houston Lighting & Power Company
Hazardous Waste Management-Waste Analysis
Demineralizer Regenerant (Sludge)

EP Toxicity (ppm)	SRB	CBY	HOC	DWP	GBY	WAP	PHR	WEB	THW
senic	<0.9	<1.0	sludge sample unobtainable H. O. Clarke	<0.05	<0.05	NA	<0.05	<0.05	<0.05
arium	<1.7	<2.0		28.5	1.1		4.0	<0.1	<11.9
admium	<0.9	<1.0		<0.05	<0.05		<1.0	<0.05	<0.05
romium	<0.9	<1.0		<0.05	<0.05		<1.0	<0.05	<0.05
ead	<1.7	<2.0		<1	<0.1		<2.0	<0.1	<0.1
ercury	<0.009	<0.01		<0.005	<0.005		<0.01	<0.005	<0.005
elenium	<0.09	<1.0		<0.05	<0.05		<0.05	<0.05	<0.05
ilver	<0.09	<1.0		<0.05	<0.05		<1.0	<0.05	<0.05
ndrin	<0.02	<0.02		<0.02	<0.02		<0.02	<0.02	<0.02
indane	<0.4	<0.04		<0.04	<0.4		<0.4	<0.4	<0.4
ethoxychlor	<1	<1		<1	<1		<1	<1	<1
oxaphene	<0.5	<0.5		<0.5	<0.5		<0.5	<0.5	<0.5
ichlorophenoxyacetic	<1	<1		<1	<1		<1	<1	<1

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Houston Lighting & Power Company
Hazardous Waste Management-Waste Analysis
Inorganic Acid (Liquid)

EP Toxicity (ppm)	SRB	CBY	HOC	DWP	GBY	WAP	PHR	WEB	THW
rsenic	<0.05	Cedar Bayou does not store/treat inorganic acid	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
arium	5.3		<0.1	<0.1	2.3	17.2	1.3	<0.1	3.6
admium	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
hromium	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	)5
ead	<0.1		<0.1	<0.1	<0.10	<0.10	<0.1	<0.1	<0.1
ercury	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.00
elenium	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ilver	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ndrin	<0.02		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	02
indane	<0.4		<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
lethoxychlor	<1		<1	<1	<1	<1	<1	<1	<1
oxaphene	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
)ichlorophenoxyacetic	<1		<1	<1	<1	<1	<1	<1	<1
[illegible]	1		<1	<1	<1	<1	<1	<1	<1

20

Houston Lighting & Power Company
Hazardous Waste Management-Waste Analysis
Inorganic Acid (Sludge)

EP Toxicity (ppm)	SRB	CBY	HOC	DWP	GBY	WAP	PHR	WEB	THW
Arsenic	<1.0	Cedar Bayou does not store/treat inorganic acid	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	16		31.5	28.5	2.4	<1	2.0	<0.1	10.7
Cadmium	<1.0		<1.0	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
Chromium	<1.0		<1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead	<2.0		<2.0	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Mercury	<0.01		<0.01	<0.005	<0.005	0.005	<0.005	<0.005	<0.005
Selenium	<1.0		<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
Silver	<1.0		<1.0	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
Endrin	<0.02		<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
Lindane	<0.4		<0.4	<0.4	<0.4	0.4	<0.4	<0.4	<0.4
Methoxychlor	<1		<1	<1	<1	<1	<1	<1	<1
Toxaphene	<0.5		<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05
Dichlorophenoxyacetic	<1		<1	<1	<1	<1	<1	<1	<1
			[illegible]	[illegible]	[illegible]	<1	<1	<1	<1

4-81

Houston Lighting & Power Company
Hazardous Waste Management-Waste Analysis
Organic Acid (Liquid)

EP Toxicity (ppm)	SRB	CBY	HOC	DWP	GBY	WAP	PHR	WEB	THW
rsenic	<0.05	<0.05 <0.05(W) <0.05(S)	H. O. Clarke does not store organic acid.	<0.05	<0.05 (N) <0.05 (S)	<0.05(#2) <0.05(#1)	<0.05	<0.05	<0.05
arium	1.19	13.5 42 <0.5		<0.5	9.2 8.9	<0.05 11.5	<0.1	0.12	1.1
admium	<0.05	<0.05 <0.05 <0.05		<0.05	<0.05 <0.05	<0.05 <0.05	<0.05	<0.05	0.08
hromium	<0.05	<0.05 <0.05 <0.05		<0.05	<0.05 <0.05	2.89 3.75	<0.05	<0.05	<0.05
ead	<0.1	<0.1 <0.1 <0.1		<0.1	<0.1 <0.1	<0.1 <0.1	<0.1	<0.10	<0.1
ercury	<0.005	<0.005 <0.005 <0.005		<0.005	<0.005 <0.005	<0.005 <0.005	<0.005	<0.005	<0.005
elenium	<0.02	<0.05 <0.05 <0.05		<0.05	<0.05 <0.05	<0.02 <0.02	<0.05	<0.05	<0.05
ilver	<0.05	<0.05 <0.1 <0.05		<0.05	<0.05 <0.05	<0.5 <0.05	<0.05	<0.05	<0.05
ndrin	<0.02	<0.02 <0.02 <0.02		<0.02	<0.02 <0.02	<0.02 <0.02	<0.02	<0.02	<0.02
indane	<0.4	<0.4 <0.4 <0.4		<0.4	<0.4 <0.4	<0.4 <0.4	<0.4	<0.4	<0.4
lethoxychlor	<1	<1 <1 <1		<1.0	<1 <1	<1 <1	<1	< 1.0	<1
oxaphene	<0.5	<0.5 <0.5 <0.5		<0.5	<0.5 <0.5	<0.5 <0.5	<0.5	<0.5	<0.5
ichlorophenoxyacetic	<1	<1 <1 <1		<1.0	<1 <1	<1 <1	<1	<1	<1
		<1 <1			<1	<1			

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22

Houston Lighting & Power Company
Hazardous Waste Management-Waste Analysis
Organic Acid (Sludge)

EP Toxicity (ppm)	SRB	CBY	HOC	DWP	GBY	WAP	PHR	WEB	THW
rsenic	< 1.0	< 1.0 < 1.0	H. O. Clarke does not store organic acid.	< 0.05	< 0.05(N) < 0.05(S)	NA	< 0.05	< 0.05	< 0.0
arium	32.7	< 2.0 59		3.6	8.1 7.9		79.7	7.5	12.
admium	< 1.0	< 1.0 < 1.0		< 0.05	< 0.05 < 0.05		< 0.05	< 0.05	< 0.0
hromium	< 1.0	< 1.0 < 1.0		< 0.05	< 0.05 < 0.05		0.28	< 0.05	05
ead	< 2.0	< 2.0 < 2.0		< 0.1	< 0.1 < 0.1		< 0.1	< 0.1	< 0.1
ercury	< 0.01	< 0.01 < 0.01		< 0.005	< 0.005 < 0.005		< 0.005	< 0.005	< 0.00
elenium	< 1.0	< 1.0 < 1.0		< 0.05	< 0.05 < 0.05		< 0.05	< 0.05	< 0.05
ilver	< 1.0	< 1.0 < 1.0		< 0.05	< 0.05 < 0.05		< 0.05	< 0.05	< 0.05
ndrin	< 0.02	< 0.02 < 0.02		< 0.02	< 0.02 < 0.02		< 0.02	< 0.02	:02
.indane	< 0.4	< 0.4 < 0.4		< 0.4	< 0.4 < 0.4		< 0.4	< 0.4	< 0.4
lethoxychlor	< 1	< 1 < 1		< 1	< 1 < 1		< 1	< 1	< 1
Toxaphene	< 0.5	< 0.5 < 0.5		< 0.5	< 0.5 < 0.5		< 0.5	< 0.5	< 0.5
)ichlorophenoxyacetic	< 1	< 1 < 1		< 1	< 1 < 1		< 1	< 1	< 1
Trichlorophenoxypropionic		< 1 1		1	< 1 1		1	1	1

23

Houston
Lighting
& Power
Company

Electric Tower
P.O. Box 1700
Houston, Texas 77001

February 23, 1981

Mr. Jay Snow
Solid Waste Section
Texas Department of Water Resources
P. O. Box 13087, Capitol Station
Austin, Texas 78711

Dear Mr. Snow:

SUBJECT: INDUSTRIAL SOLID WASTE RECLASSIFICATION
MISCELLANEOUS INORGANIC SLUDGES
TDWR WASTE CODE NOS. 140540 and 240540

Pursuant to requirements set forth under RCRA, we have analyzed representative samples of inorganic sludge collected from sludge drying beds at stations where sludge drying beds exist. The sludge originates from chemical waste treatment systems associated with our power plants, and was reported as being hazardous on our Part A, TDWR Hazardous Waste permit applications on the basis of EP Toxicity. Presently on our TDWR Solid Waste Registrations this inorganic sludge is classified as either a Class I or Class II Solid Waste.

The attached table summarizes the EP toxicity test results performed on each sludge sample. The analysis was performed by our contract laboratory, Southern Petroleum Laboratories, and was done in accordance with the extraction procedures outlined by the EPA in Part 261, Appendix II of the Hazardous Waste Regulations. As a basis for comparison, column I of the table represents the test results of sludge from the cooling tower clarifier at our Greens Bayou Generating Station. This sludge has a Class III classification.

Based on the results identified in the table we believe that the inorganic sludge from our chemical waste treatment systems should be classified as Class III waste material as is the sludge from the cooling tower clarifier.

If you concur with this reclassification please notify us so that we can inform our personnel who handle this material.

Sincerely,

D. B. Chin
Principal Engineer, Water Quality
Environmental Protection Department

RTB/dhj
Attachment

HOUSTON LIGHTING & POWER COMPANY

Inorganic Sludge EP Toxicity Test Results

	TDWR # 31634 Greens Bayou Cooling Tower Blowdown Class III	TDWR # 31639 Cedar Bayou	TDWR # 31632 Deepwater	TDWR # 31633 Webster	TDWR # 31636 T.H.Wharton (South)	TDWR # 31636 T.H.Wharton (North)
rsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
arium	<1.0	21	<1.0	<2.1	<1.0	<1.0
admium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
romium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.[illegible]
ead	<0.10	<0.10	<0.10	<0.10	<0.10	<0.05
ercury	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
elenium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
ilver	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ndrin	<0.02	<0.02	<0.02	<0.02	<0.02	<0[illegible]
indane	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
ethoxychlor	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
oxaphene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
ichlorophenoxyacetic	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
richlorphenoxypropionic	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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25

SOUTHERN PETROLEUM LABORATORIES, INC.

P.O. BOX 20807
HOUSTON, TX 77025

P.O. BOX 52768
LAFAYETTE, LA 70505

P.O. BOX 10276
JEFFERSON, LA 70181

P.O. BOX 378
ACME, MI 49610

Certificate Number 045592
Invoice Number 123528
March 24, 1982

Houston Lighting & Power Company
Energy Development Complex
P.O. Box 1700
Houston, Texas 77001

Attention: Mr. Rick Bye

Sample Description: WAP 301 Gas Plant (Units 1-4) Sludge tanks
Date Sampled: 03/11/82
Date Received: 03/12/82

			Date	Time	Analyst
Trichlorophenoxypropionic	< 1.0	mg/l	03/19/82	8:00 am	JDM
Dichlorophenoxyacetic	< 1.0	mg/l	03/19/82	8:00 am	JDM
Silver total EPA storet number 01077	< 0.05	mg/l	03/16/82	10:30 am	KES
Arsenic total EPA storet number 01002	< 0.05	mg/l	03/18/82	8:00 am	KES
Barium total EPA storet number 01007	< 0.1	mg/l	03/18/82	2:00 pm	KES
Cadmium total EPA storet number 01027	< 0.05	mg/l	03/16/82	9:30 am	KES
Corrosivity	< 1	mmpy	03/12/82	4:00 pm	DDP
Chromium total EPA storet number 01034	< 0.05	mg/l	03/16/82	11:00 am	KES
Endrin	< 0.02	mg/l	03/19/82	8:00 am	JDM
Flash Point	> 200	degF	03/17/82	8:00 am	SRG
Mercury total EPA storet number 71900	< 0.005	mg/l	03/17/82	9:00 am	KES
Lindane	< 0.4	mg/l	03/19/82	8:00 am	JDM

SPL-103-5 PT.

SOUTHERN PETROLEUM LABORATORIES, INC.

P.O. BOX 20807
HOUSTON, TX 77025

P.O. BOX 52768
LAFAYETTE, LA 70505

P.O. BOX 10276
JEFFERSON, LA 70181

P.O. BOX 378
ACME, MI 49610

Certificate Number 045592, page 2
Houston Lighting & Power Company

Methoxychlor	< 1.0	mg/l	03/19/82	8:00 am	JDM
Lead total EPA storet number 01051	< 0.1	mg/l	03/16/82	10:00 am	KES
Selenium total EPA storet number 01147	< 0.05	mg/l	03/16/82	1:00 pm	KES
Toxaphene	< 0.5	mg/l	03/19/82	8:00 am	JDM

Quality Assurance: These analyses are performed in accordance with EPA quidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

Sammy Russo

Sammy Russo

SPL-103-5 PT.

27

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SOUTHERN PETROLEUM LABORATORIES, INC.

P.O. BOX 20807
HOUSTON, TX 77025

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LAFAYETTE, LA 70505

P.O. BOX 10276
JEFFERSON, LA 70181

P.O. BOX 378
ACME, MI 49610

Certificate Number 045593
Invoice Number 123528
March 24, 1982

Houston Lighting & Power Company
Energy Development Complex
P.O. Box 1700
Houston, Texas 77001

Attention: Mr. Rick Bye

Sample Description: W.A. Parish
Units #5 & 6
Floor drain, sludge tank
Date Sampled: 03/11/82
Date Received: 03/12/82

			Date	Time	Analyst
Trichlorophenoxypropionic	< 1.0	mg/l	03/19/82	8:00 am	JDM
Dichlorophenoxyacetic	< 1.0	mg/l	03/19/82	8:00 am	JDM
Silver total EPA storet number 01077	< 0.05	mg/l	03/16/82	10:30 am	KES
Arsenic total EPA storet number 01002	< 0.05	mg/l	03/18/82	8:00 am	KES
Barium total EPA storet number 01007	< 0.1	mg/l	03/18/82	2:00 pm	KES
Cadmium total EPA storet number 01027	< 0.05	mg/l	03/16/82	9:30 am	KES
Corrosivity	< 1	mmpy	03/12/82	4:00 pm	DDP
Chromium total EPA storet number 01034	< 0.05	mg/l	03/16/82	11:00 am	KES
Endrin	< 0.02	mg/l	03/19/82	8:00 am	JDM
Flash Point	> 200	degF	03/17/82	8:00 am	SRG
Mercury total EPA storet number 71900	< 0.005	mg/l	03/17/82	9:00 am	KES
Lindane	< 0.4	mg/l	03/19/82	8:00 am	JDM

SPL-103-5 PT.

SPL

SOUTHERN PETROLEUM LABORATORIES, INC.

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HOUSTON, TX 77025

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LAFAYETTE, LA 70505

P.O. BOX 10276
JEFFERSON, LA 70181

P.O. BOX 378
ACME, MI 49610

Certificate Number 045593, page 2
Houston Lighting & Power Company

Methoxychlor	< 1.0	mg/l	03/19/82	8:00 am	JDM
Lead total EPA storet number 01051	< 0.1	mg/l	03/16/82	10:00 am	KES
Selenium total EPA storet number 01147	< 0.05	mg/l	03/16/82	1:00 pm	KES
Toxaphene	< 0.5	mg/l	03/19/82	8:00 am	JDM

Quality Assurance: These analyses are performed in accordance with EPA quidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

Sammy Russo

Sammy Russo

SPL
SOUTHERN PETROLEUM LABORATORIES, INC.

P.O. BOX 20807
HOUSTON, TX 77025

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LAFAYETTE, LA 70505

P.O. BOX 10276
JEFFERSON, LA 70181

P.O. BOX 378
ACME, MI 49610

Certificate Number 045594
Invoice Number 123528
March 24, 1982

Houston Lighting & Power Company
Energy Development Complex
P.O. Box 1700
Houston, Texas 77001

Attention: Mr. Rick Bye

Sample Description: W.A. Parish
#7 Oily Waste
Oil sump

Date Sampled: 03/11/82
Date Received: 03/12/82

			Date	Time	Analyst
Trichlorophenoxypropionic	< 1.0	mg/l	03/19/82	8:00 am	JDM
Dichlorophenoxyacetic	< 1.0	mg/l	03/19/82	8:00 am	JDM
Silver total EPA storet number 01077	< 0.05	mg/l	03/16/82	10:30 am	KES
Arsenic total EPA storet number 01002	< 0.05	mg/l	03/18/82	8:00 am	KES
Barium total EPA storet number 01007	< 0.1	mg/l	03/18/82	2:00 pm	KES
Cadmium total EPA storet number 01027	< 0.05	mg/l	03/16/82	9:30 am	KES
Corrosivity	< 1	mmpy	03/12/82	4:00 pm	DDP
Chromium total EPA storet number 01034	< 0.05	mg/l	03/16/82	11:00 am	KES
Endrin	< 0.02	mg/l	03/19/82	8:00 am	JDM
Flash Point	192	degF	03/17/82	8:00 am	SRG
Mercury total EPA storet number 71900	< 0.005	mg/l	03/17/82	9:00 am	KES
Lindane	< 0.4	mg/l	03/19/82	8:00 am	JDM

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SOUTHERN PETROLEUM LABORATORIES, INC.

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HOUSTON, TX 77025

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JEFFERSON, LA 70181

P.O. BOX 378
ACME, MI 49610

Certificate Number 045594, page 2
Houston Lighting & Power Company

Methoxychlor	< 1.0	mg/l	03/19/82	8:00 am	JDM
Lead total EPA storet number 01051	< 0.1	mg/l	03/16/82	10:00 am	KES
Selenium total EPA storet number 01147	< 0.05	mg/l	03/16/82	1:00 pm	KES
Toxaphene	< 0.5	mg/l	03/19/82	8:00 am	JDM

Quality Assurance: These analyses are performed in accordance with EPA quidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

Sammy Russo

Sammy Russo

SPL-103-5 PT.

Reference 7

Send original copy by
certified mail to the
Texas Water Development Board
P. O. Box 13087
Austin, Texas 78711

State of Texas

WATER WELL REPORT

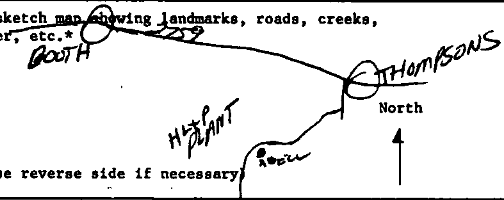
For TWDB use only
Well No. 65-36-1C
Located on map yes
Received: 75
dl

1) OWNER:
Person having well drilled JOSEPH ULLRICH, SR. (Name) Address P.O. BOX (Street or RFD) THOMPSONS (City) TEX (State)

Landowner JOSEPH ULLRICH, SR. (Name) Address P.O. BOX (Street or RFD) THOMPSONS (City) TEX (State)

2) LOCATION OF WELL:
County FT. BEND, 2 1/2 miles in W (N.E., S.W., etc.) direction from THOMPSONS (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*



(Use reverse side if necessary)

or

Give legal location with distances and directions from adjacent sections or survey lines.

Labor ______ League ______

Block ______ Survey SAMUEL KENNEDY

Abstract No. 44

(NW¼ NE¼ SW¼ SE¼) of Section ______

3) TYPE OF WORK (Check): ✓ New Well; Deepening; Reconditioning; Plugging

4) PROPOSED USE (Check): ✓ Domestic; Industrial; Municipal; Irrigation; Test Well; Other

5) TYPE OF WELL (Check): ✓ Rotary; Driven; Dug; Cable; Jetted; Bored

6) WELL LOG:
Diameter of hole 3 1/2 in. Depth drilled 95 ft. Depth of completed well 96 ft. Date drilled 7-30-74

All measurements made from 1 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	1	TOP SOIL
1	7	CLAY
7	25	SAND
25	61	CLAY
61	100	COARSE SAND & GRAVEL

(Use reverse side if necessary)

9) Casing:
Type: Old ✓ New Steel ✓ Plastic Other

Cemented from ______ ft. to ______ ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage

10) SCREEN:
Type 6' X 2" PLASTIC

Perforated Slotted

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size

7) COMPLETION (Check):
✓ Straight wall; Gravel packed; Other; Under reamed; Open Hole

8) WATER LEVEL:
Static level 48 ft. below land surface Date 7-30-74

Artesian pressure ______ lbs. per square inch Date ______

Depth to pump bowls, cylinder, jet, etc., ______ ft. below land surface.

11) WELL TESTS:
Was a pump test made? ✓ Yes No If yes, by whom? DRILLER

Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

Bailer test ______ gpm with ______ ft. drawdown after ______ hrs.

Artesian flow ______ gpm

Temperature of water ______

12) WATER QUALITY:
Was a chemical analysis made? Yes ✓ No

Did any strata contain undesirable water? Yes ✓ No

Type of water? Good depth of strata ______

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME HENRY ONDREY, JR. (Type or Print) Water Well Drillers Registration No. 1043

ADDRESS RT. 1, BOX 58A1 (Street or RFD) ROSENBERG, (City) TEXAS (State)

(Signed) Henry Ondrey, Jr. (Water Well Driller) ONDREY WATER-WELL SERVICE (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-6

Dup

Send original copy by certified mail to the Texas Water Development Board
P. O. Box 13087
Austin, Texas 78711

State of Texas

WATER WELL REPORT

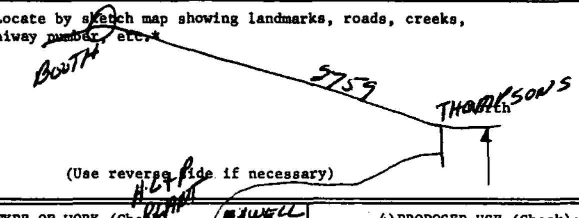
For TWDB use only
Well No. 65-36-1C
Located on map yes
Received: 7-5-74
dl

1) OWNER:
Person having well drilled JOSEPH ULLRICH, JR (Name) Address P.O. BOX (Street or RFD) THOMPSONS, (City) TEX. (State)

Landowner JOSEPH ULLRICH, JR (Name) Address P.O. BOX (Street or RFD) THOMPSONS, (City) TEX (State)

2) LOCATION OF WELL:
County FT. BEND, 2 miles in W (N.E., S.W., etc.) direction from THOMPSONS (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*



(Use reverse side if necessary)

or

Give legal location with distances and directions from adjacent sections or survey lines.

Labor ______ League ______

Block ______ Survey SAMUEL KENNEDY

Abstract No. 44

(NW¼ NE¼ SW¼ SE¼) of Section ______

3) TYPE OF WORK (Check):
✓ New Well   Deepening
Reconditioning   Plugging

4) PROPOSED USE (Check):
✓ Domestic   Industrial   Municipal
Irrigation   Test Well   Other

5) TYPE OF WELL (Check):
✓ Rotary   Driven   Dug
Cable   Jetted   Bored

6) WELL LOG:
Diameter of hole 3½ in. Depth drilled 148 ft. Depth of completed well 149 ft. Date drilled 8-10-74

All measurements made from 1 ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	1	SANDY SOIL
1	10	CLAY
10	25	SAND
25	58	CLAY
58	100	SAND
100	142	CLAY
142	149	COARSE SAND & GRAVEL

(Use reverse side if necessary)

9) Casing:
Type: Old ✓ New Steel ✓ Plastic Other

Cemented from ______ ft. to ______ ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage

10) SCREEN:
Type 6'X2" PLASTIC

Perforated   Slotted

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot Size

7) COMPLETION (Check):
✓ Straight wall   Gravel packed   Other
Under reamed   Open Hole

8) WATER LEVEL:
Static level 55 ft. below land surface Date 8-10-74

Artesian pressure ______ lbs. per square inch Date ______

Depth to pump bowls, cylinder, jet, etc., ______ ft. below land surface.

11) WELL TESTS:
Was a pump test made? ✓ Yes No If yes, by whom? DRILLER

Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

Bailer test ______ gpm with ______ ft. drawdown after ______ hrs.

Artesian flow ______ gpm

Temperature of water ______

12) WATER QUALITY:
Was a chemical analysis made? Yes ✓ No

Did any strata contain undesirable water? Yes ✓ No

Type of water? Good depth of strata ______

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME HENRY ONDREY, JR (Type or Print) Water Well Drillers Registration No. 1043

ADDRESS RT. 1, BOX 58A, (Street or RFD) ROSENBERG, (City) TEXAS 77471 (State)

(Signed) Henry Ondrey, Jr. (Water Well Driller) ONDREY WATER-WELL SERVICE (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-8

Reference 8

RECORD OF COMMUNICATION Reference 8	[xx] Phone Call [ ] Conference	[ ] Discussion [ ] Field Trip [ ] Other (specify)

(Record Of Item Checked Above)

TO: Carol Cox FIT Env. Scientist EPA Region VI ICF Technology 214-744-1641	FROM: Dorinda Sullivan Manager, Texas Natural Heritage Program, Resource Protection Division	DATE: 2-21-90 TIME: 2:22 p.m.

SUBJECT: Sensitive Environments Near Smithers Lake, Rabbs Bayou, Fort Bend County, Texas

SUMMARY OF COMMUNICATION:

Ms. Sullivan listed Brazos Bend State Park and Darrington State Prison Farm as being within the research area. Worthington Lake, in the 1 - 2 mile radius, is a Bald Eagle rookery.

Carol Cox

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted.

Reference 9

Attachment G

W. A. Parish Generating Station

Process Description for Hazardous Waste Streams

1. Demineralizer Regenerant (EPA Hazard Code C)
Demineralizer Regenerant Inorganic Sludge (EPA Hazard Code E)

The demineralizer regenerant wastes (DRW) for Units 1-4 are collected in a holding basin prior to being pumped to the Units 5 and 6 treatment system. The DRW from Units 1-8 are collected in equalization basins for preliminary equalization and sedimentation. The accumulated demineralizer regenerant inorganic sludge (DRIS) is periodically removed to the rotary vacuum filter in the sludge dewatering system, thence to the ash pond. The DRW for Units 1-6 are treated in Units 5 and 6 chemical waste treatment system. This system consists of a solids contact clarifier and primary and secondary pH adjustment control system reaction mixing tanks for suspended solids removal and pH adjustment. A similar system is used for Units 7 and 8.

2. Metal Cleaning Organic Waste (EPA Hazard Code E)
Metal Cleaning Organic Sludge (EPA Hazard Code E)

The organic metal cleaning wastes (OMCW) comprised of hydroxyacetic-formic acid (HAF) and ammoniated citric acid (AC) organic cleaning wastes for Units 1-4 are collected by gravity into two boiler cleaning waste holding basins. The OMCW for Units 5-8 are collected in two holding basins located adjacent to Units 5 and 6 for equalization. The OMCW for Units 1-8 is then injected into Units 5 or 6 for ultimate disposal. The accumulated sludge is periodically removed to the rotary vacuum filter in the sludge dewatering system, thence to the ash pond by truck.

3. Metal Cleaning Inorganic Acid (EPA Hazard Code C,E)
Metal Cleaning Inorganic Sludge (EPA Hazard Code E)

The inorganic metal cleaning waste (IMCW) composed primarily of inhibited hydrochloric acid is generated infrequently from miscellaneous equipment cleaning and Units 1, 2 and 3 boiler cleaning. The IMCW is collected in one of the two boiler cleaning waste pits located adjacent to Units 1-4 for subsequent treatment in the Units 5 and 6 chemical waste treatment system for pH adjustment, metal precipitation and sedimentation. The miscellaneous equipment cleaning for Units 5-8 are transferred to the Unit 5-8 chemical waste treatment systems respectively to receive treatment. The metal cleaning inorganic sludge (MCIS) which accumulates in the basins is periodically sent to the rotary vacuum filter in the sludge dewatering system and thence to the ash pond.

4. Chemical Waste Treatment System Sludge (EPA Hazard Code E)

The sludge generated in the chemical waste treatment systems, (i.e., treatment for demineralizer regenerant, boiler blowdown and inorganic metal cleaning waste) is pumped to the sludge dewatering system, (i.e., vacuum filter) and subsequently disposed of in the clay lined ash pond.

5. Waste Oil and Sludge (EPA Hazard Code T,O)

The waste oil and grease removed from the oily waste treatment system and the SPCC facilities are collected in:

for Unit 1-4

oil traps, API separator, waste oil storage sump and Tricellorator.

W. A. Parish Generating Station Units 1-8
(Continued)

for Units 5 and 6

Lift stations, the oily waste treatment system retention pond and the Tricellorator.

for Units 7 and 8

Same as for Units 5 and 6

The waste oil and sludge accumulated in the above systems are trucked off-site for disposal.

Table III-4 Hazardous Waste Facility Components List

Facility Component		Status			Design Capacity			Number of Years Utilized	Date in Service
Name	TDWR Seq. No.	Inactive	Active	Proposed	(cu yds)	(gal)	(lbs)		
Basin (concrete,above-grade, lined)			2			178,922 ea.		2	1978
Verbal Description: fiberglass lined basin for the collection of low volume waste including make-up demineralizer regenerant wastes, condensate polisher backwash, boiler area, fly ash silo area and precipitator washdown									
Basin (concrete, above-grade lined)				2		296,000 ea.		under construction	
Verbal Description: fiberglass lined basin for the collection of low volume waste including make up demineralizer regenerant wastes, condensate polisher backwash, boiler area, fly ash silo area and precipitator washdown.									
Basin (concrete, below grade, lined)			1			50,000		2	1978
Verbal Description: temporary storage of demineralizer regenerant wastes prior to transfer for treatment									
Tank (Surface processing)			1				1,842,000	2	1978
Verbal Description: Steel constructed solids contact clarifier for precipitation of floating solids. Sludge is removed to a thickener, thence to a rotary vacuum filter. Dried sludge is trucked to the ash pond.									
Tank (surface processing)				1			NA	under construction	
Verbal Description: Steel constructed solids contact clarifier for precipitation of floating solids. Sludge is removed to a thickener, thence to a rotary vacuum filter. Dried sludge is trucked to the ash pond.									
Lagoon/Pond (lined)			1					2	1978
Verbal Description: Clay lined pond for the disposal of various treatment sludges from the low volume and metal cleaning wastes treatment system and ash from coal burning.									

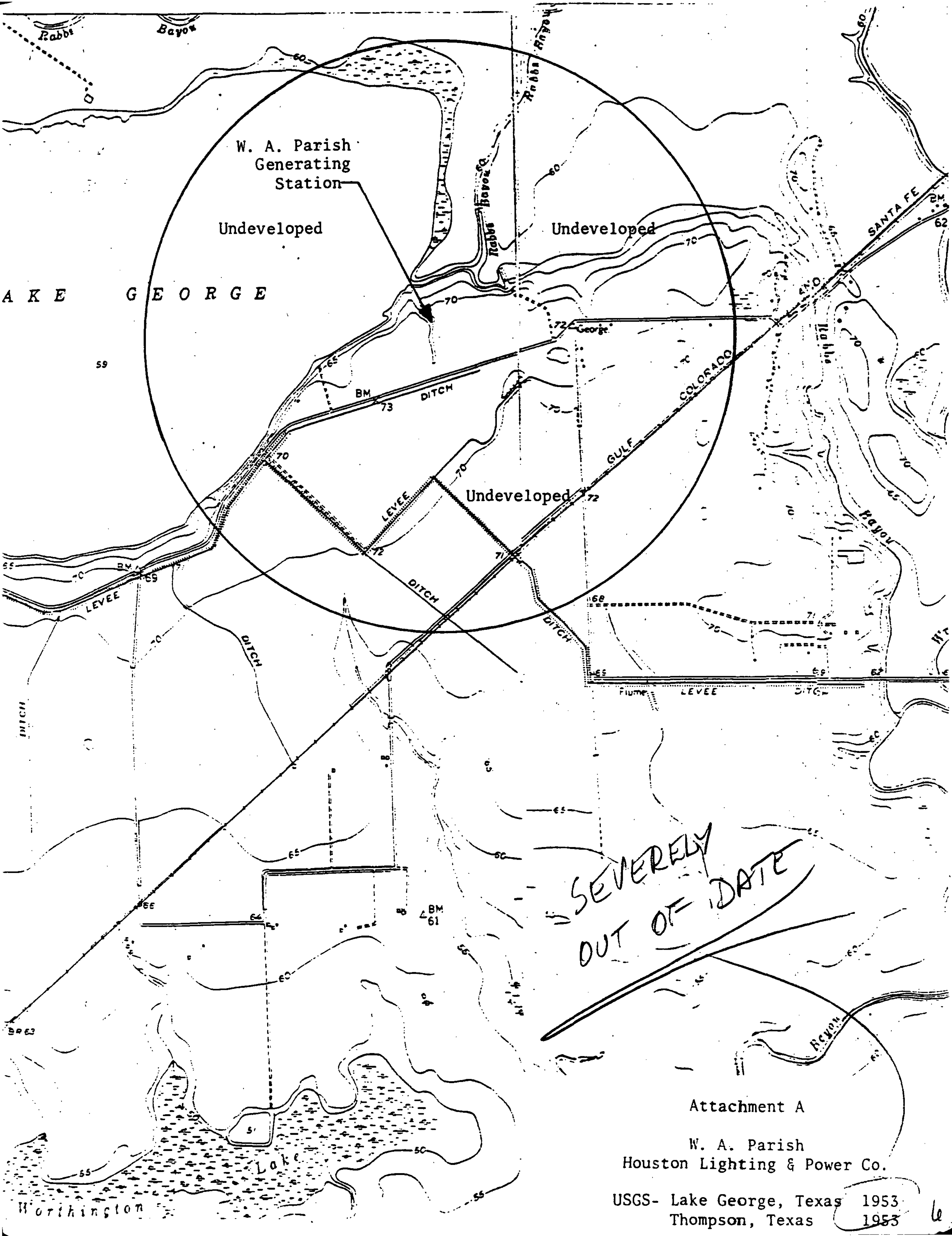
Table III-4 Hazardous Waste Facility Components List

Facility Component: Name	Facility Component: TDWR Seq. No.	Status: Inactive	Status: Active	Status: Proposed	Design Capacity: (cu yds)	Design Capacity: (gal)	Design Capacity: (lbs)	Number of Years Utilized	Date in Service
Basin (concrete, above grade, lined)			2			850,000 ea.		2	1978
Verbal Description: fiberglass lined basin for the collection of inorganic wastes including hydrochloric acid boiler cleaning, boiler blowdown, air preheater wash.									
Basin (concrete, above grade, lined)				2		1,000,000		under construct	
Verbal Description: fiberglass lined basin for the collection of inorganic wastes including hydrochloric acid boiler cleaning, boiler blowdown, air preheater wash.									
Basin (concrete, below grade, lined)			2			21,000 & 50,000		2	1978
Verbal Description: temporary storage of organic/inorganic boiler cleaning wastes prior to transfer for boiler injection or treatment.									
Tank (surface processing)			1				902,000	2	1978
Verbal Description: steel constructed solids contact clarifier for the precipitation of floating solids. This sludge is removed to a thickener, thence to a rotary vacuum filter. Dried sludge is trucked to the ash pond.									
Tank (surface processing)				1			NA	under construction	
Verbal Description: steel constructed solids contact clarifier for the precipitation of floating solids. This sludge is removed to a thickener, thence to a rotary vacuum filter. Dried sludge is trucked to the ash pond.									
Basin (concrete, above grade, lined)			2			178,922 ea.		2	1978
Verbal Description: fiberglass lined basin for the collection/ retention of all organic cleaning wastes prior to boiler injection.									

Table III-3 Hazardous Waste Facility Components List

Facility Component Name	HDWR Seq. No.	Status Inactive	Active	Proposed	Design Capacity (cu yds)	(gal)	(lbs)	Number of Years Utilized	Date in Service
Tank (surface storage)			1			2,000		3	1977
Verbal Description: Tank used for the collection of waste oil and sludge which is accumulated from the oily waste treatment system.									
Basin (concrete, below grade, lined)			1			1,500			19.
Verbal Description: Tank used for the collection of waste oil and sludge which is accumulated from the oily waste treatment system.									
Basin (concrete, below grade, lined)			1			1,500		3	1977
Verbal Description: Tank used for the collection of waste oil and sludge which is accumulaged form the oily waste treatment system.									
Other			X		NA	NA	NA	NA	NA
Verbal Description: Asbestos used for insulation will be placed in bags and wet down prior to off-site disposal. Actual percent asbestos content is variable but small.									
Drum storage area (other)			X		NA	NA	NA	NA	N.
Verbal Description: Drum storage area for the collection of waste solvents used in degreasing and painting operations, prior to off-site disposal.									
8 Lagoon/Pond (lined)			3			5,000,000 1,000,000 500,000		2	1978
Verbal Description: Lined ponds for the collection of inorganic acids, boiler blowdown, and their associated sludges.									

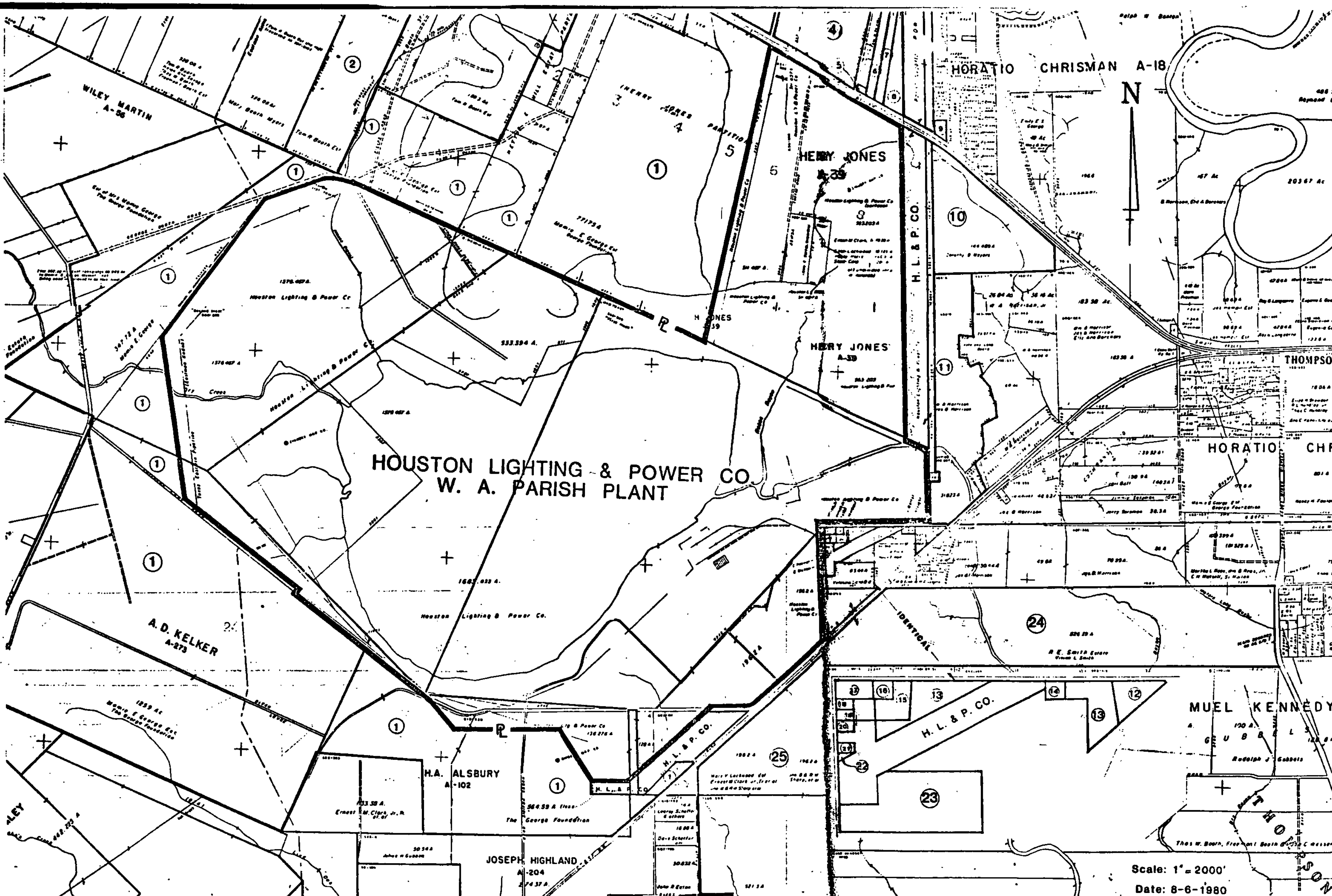
5



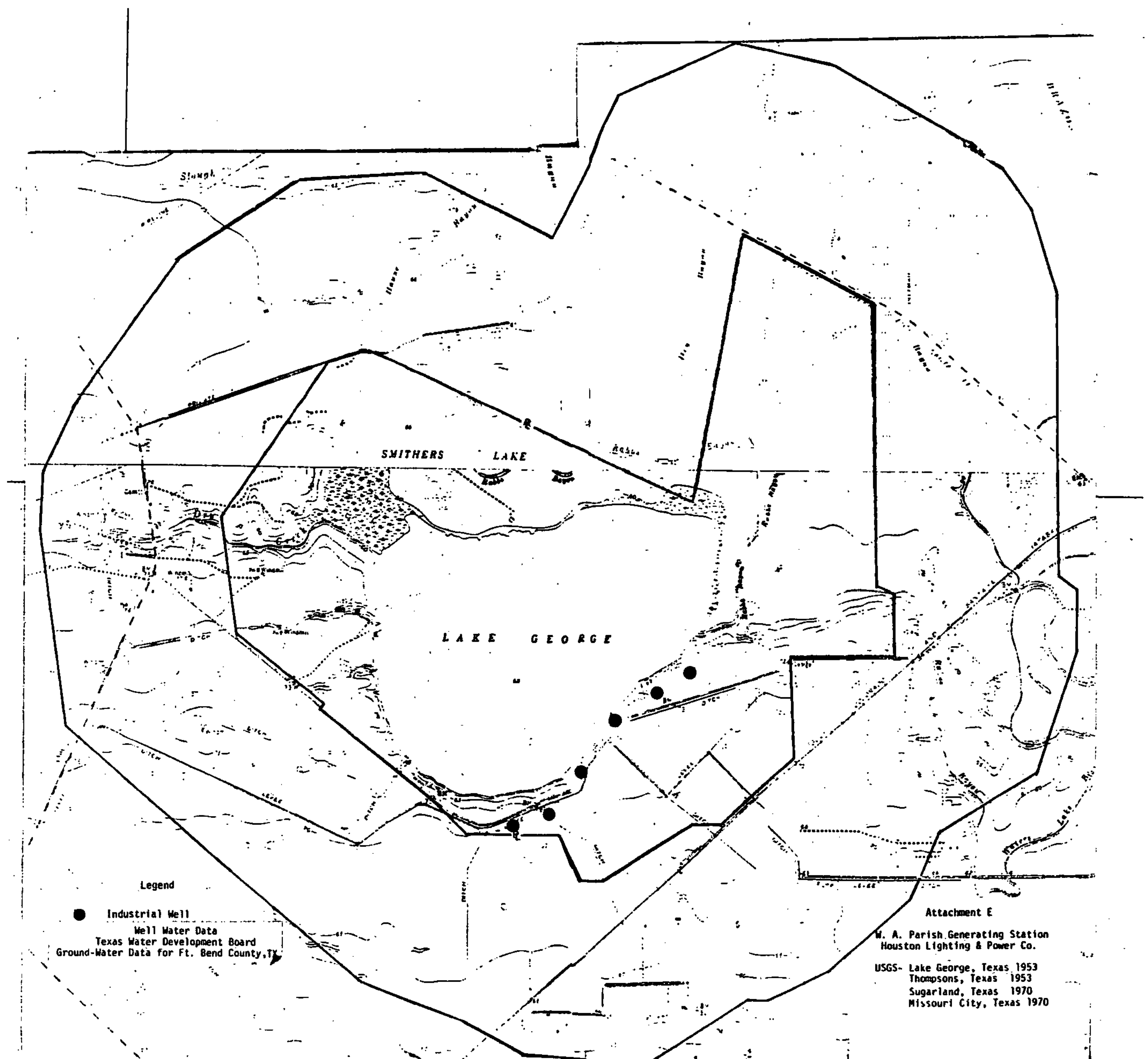
Attachment A

W. A. Parish
Houston Lighting & Power Co.

USGS- Lake George, Texas 1953
Thompson, Texas 1953



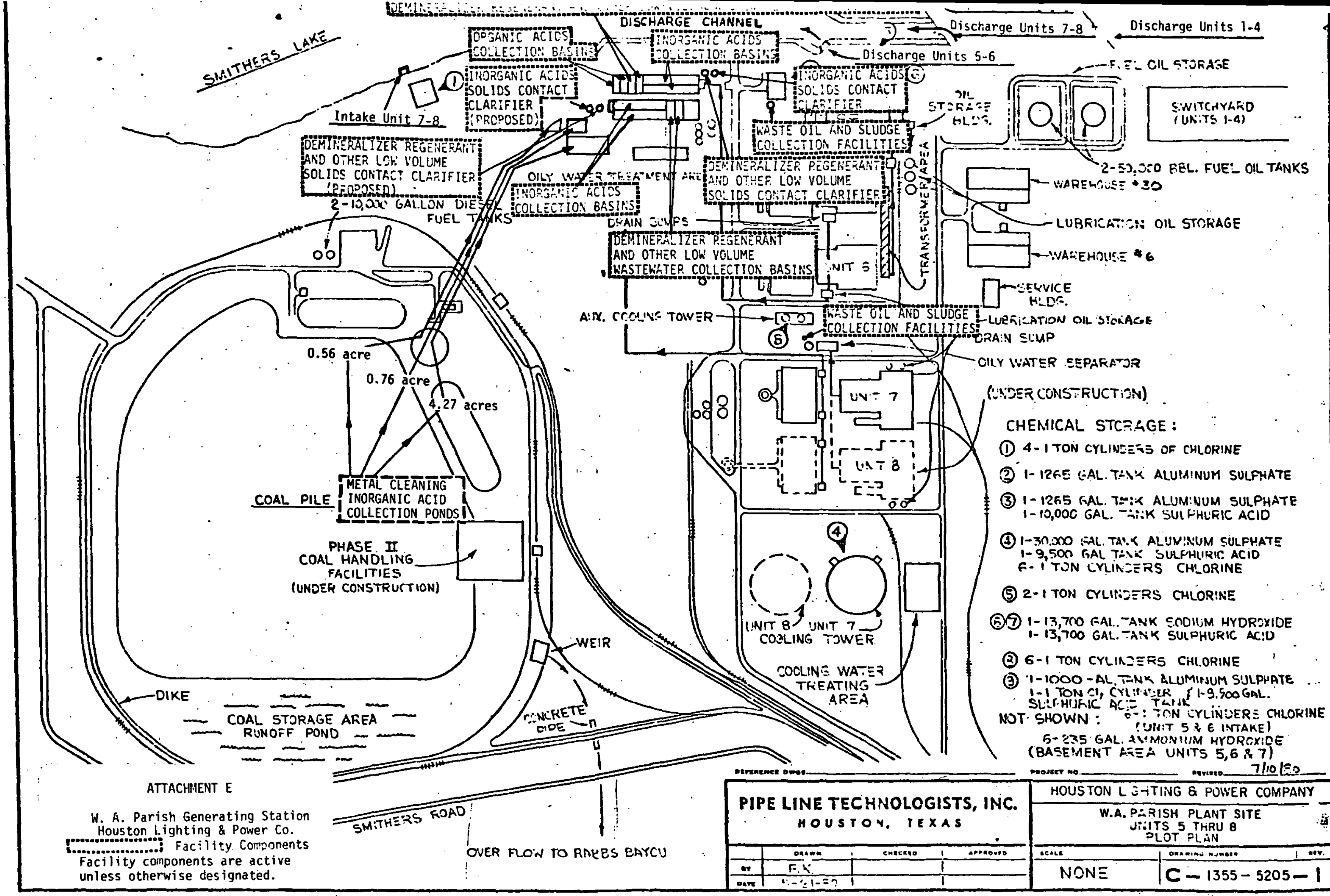
HOUSTON LIGHTING & POWER CO
W. A. PARISH PLANT
WILEY MARTIN
A-56
HORATIO CHRISMAN A-18
N
HENRY JONES
A-39
H. L. & P. CO.
THOMPSONS
HORATIO
A. D. KELKER
A-273
H.A. ALSBURY
A-102
JOSEPH HIGHLAND
A-204
H. L. & P. CO.
IDENTICAL
MUEL KENNEDY
Houston Lighting & Power Co.
The George Foundation
A. E. Smith Estate
Scale: 1" = 2000'
Date: 8-6-1980



Attachment E

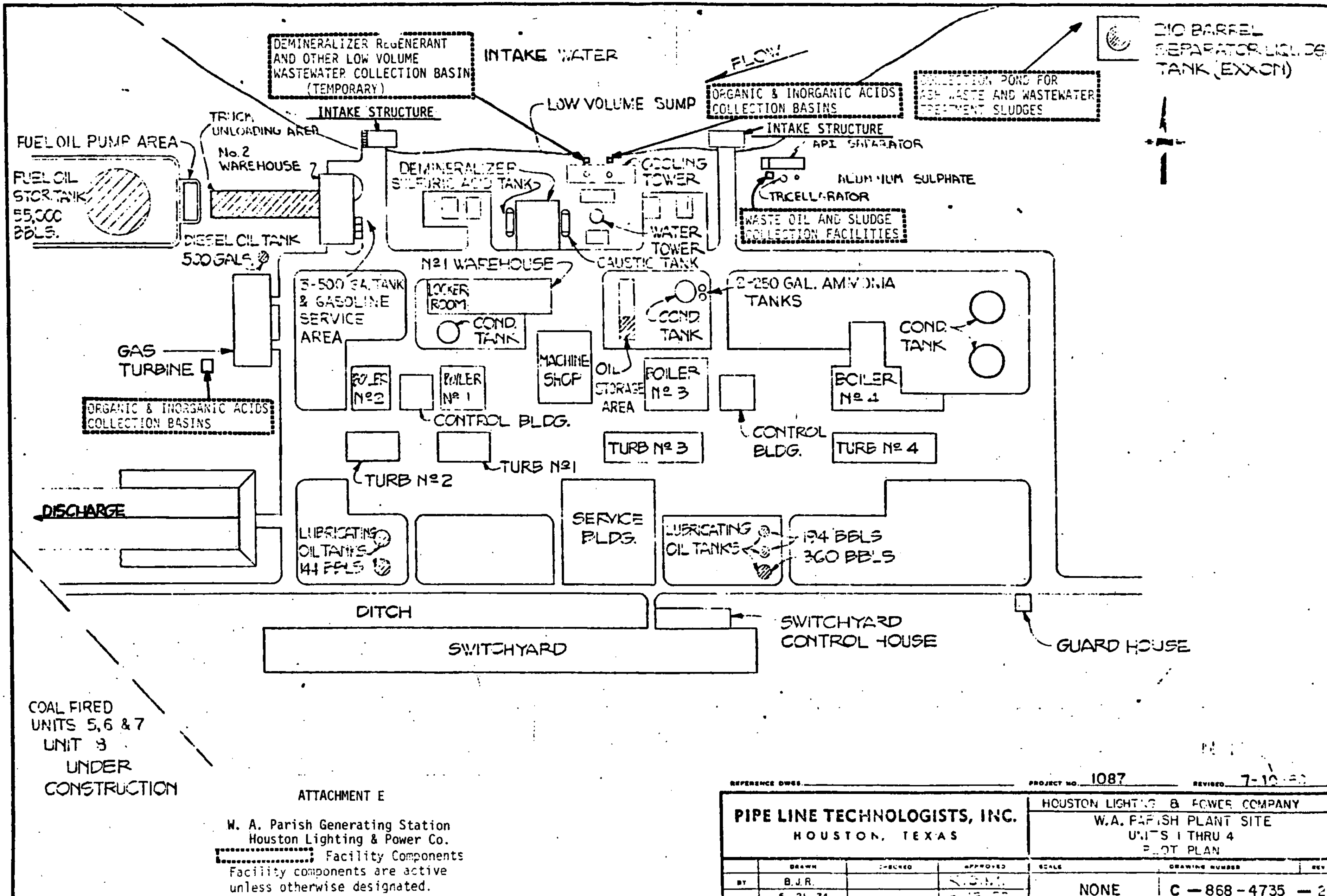
W. A. Parish Generating Station
Houston Lighting & Power Co.

USGS- Lake George, Texas 1953
Thompsons, Texas 1953
Sugarland, Texas 1970
Missouri City, Texas 1970



ATTACHMENT E

W. A. Parish Generating Station
Houston Lighting & Power Co.
Facility Components
Facility components are active unless otherwise designated.



ATTACHMENT E

W. A. Parish Generating Station
Houston Lighting & Power Co.
Facility Components
Facility components are active unless otherwise designated.

Reference 10

TDWR OPEN DUMP INVENTORY
INSPECTOR'S COMMENTS
HOUSTON LIGHTING & POWER
W. A. PARISH GENERATING STATION
TDWR REGISTRATION NO. 31631
INSPECTION JUNE 8, 1983

Elizabeth L. Whitney met with Ellen Zampello and Richard Bye of the Houston Lighting and Power Company on Wednesday, June 8, 1983. The facility investigated was Facility No. 01, a lagoon at the W. A. Parish Generating Station, TDWR No. 31631.

The lagoon has a registered size of 945.868 acres. Currently 80 acres are in use. The facility handles three wastes, Sequence Nos. 002, Miscellaneous Inorganic Sludges; 004, Boiler Ash; and 020, Fly Ash.

The fly ash disposal is contracted to Ash Management, Inc. of Marietta, Georgia. Fly Ash is brought to the lagoon via truck. A portable header transports lagoon water to the truck and the water is mixed with the fly ash to form a slurry. The slurry is then discharged to a system of cells. In the cell, the heavier ash settles out and is sold for recovery. One use is as a road base material. Any excess water in the cell is discharged back to the lagoon.

Bottom ash is also stockpiled at the site in a small area. This material is retrieved from the boiler and is sold for recovery.

Flue Gas Desulfurization sludge is stockpiled in another portion of the permitted lagoon area. This sludge has recently been declassified as a hazardous waste and is now classified as Class II. It is dry when stockpiled. Houston Lighting and Power also plans to sell this waste for recovery. Marketing plans are underway currently. The stockpiling of this sludge at the facility began this Spring.

Three other wastes, Sequence Nos. 012, Demineralizer Regenerant Sludge; 014, Sludge containing Inorganics; and 016, Sludge containing Organics are not currently disposed of in the lagoon area. These wastes are on the Solid Waste Registration in the event of a need at the generating station to clean out tanks containing this matter.

Compliance Data on next page

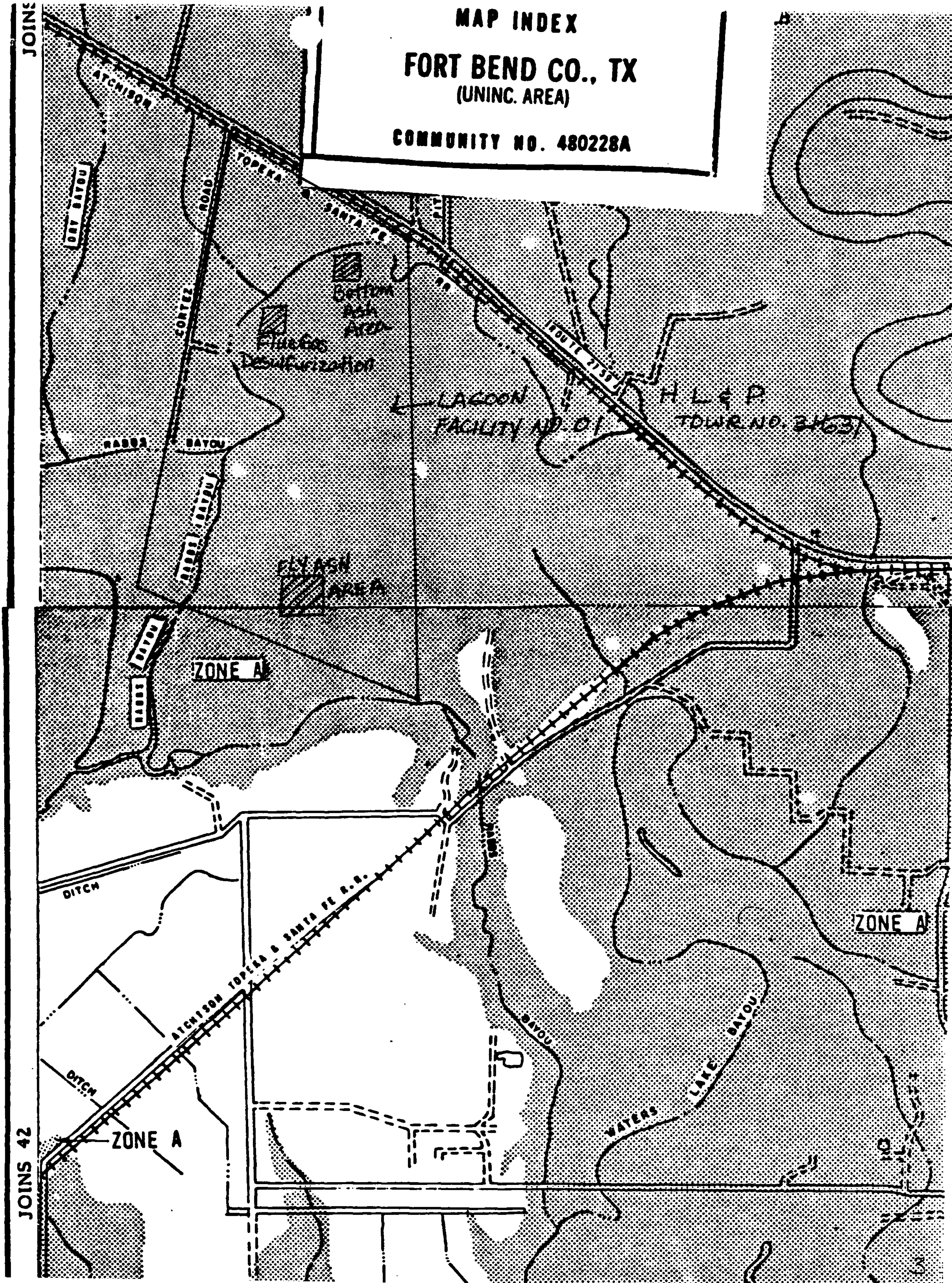
There are no dikes surrounding the lagoon area. Mr. Bye, Environmental Engineer for Houston Lighting & Power, stated that the facility is not in the 100 year flood plain. In addition, he stated the acreage in use is small in comparison to the permitted area. An inspection of perimeter contours of the lagoon area shows contaminated runoff would be contained within the 945.868 acre area according to Mr. Bye.

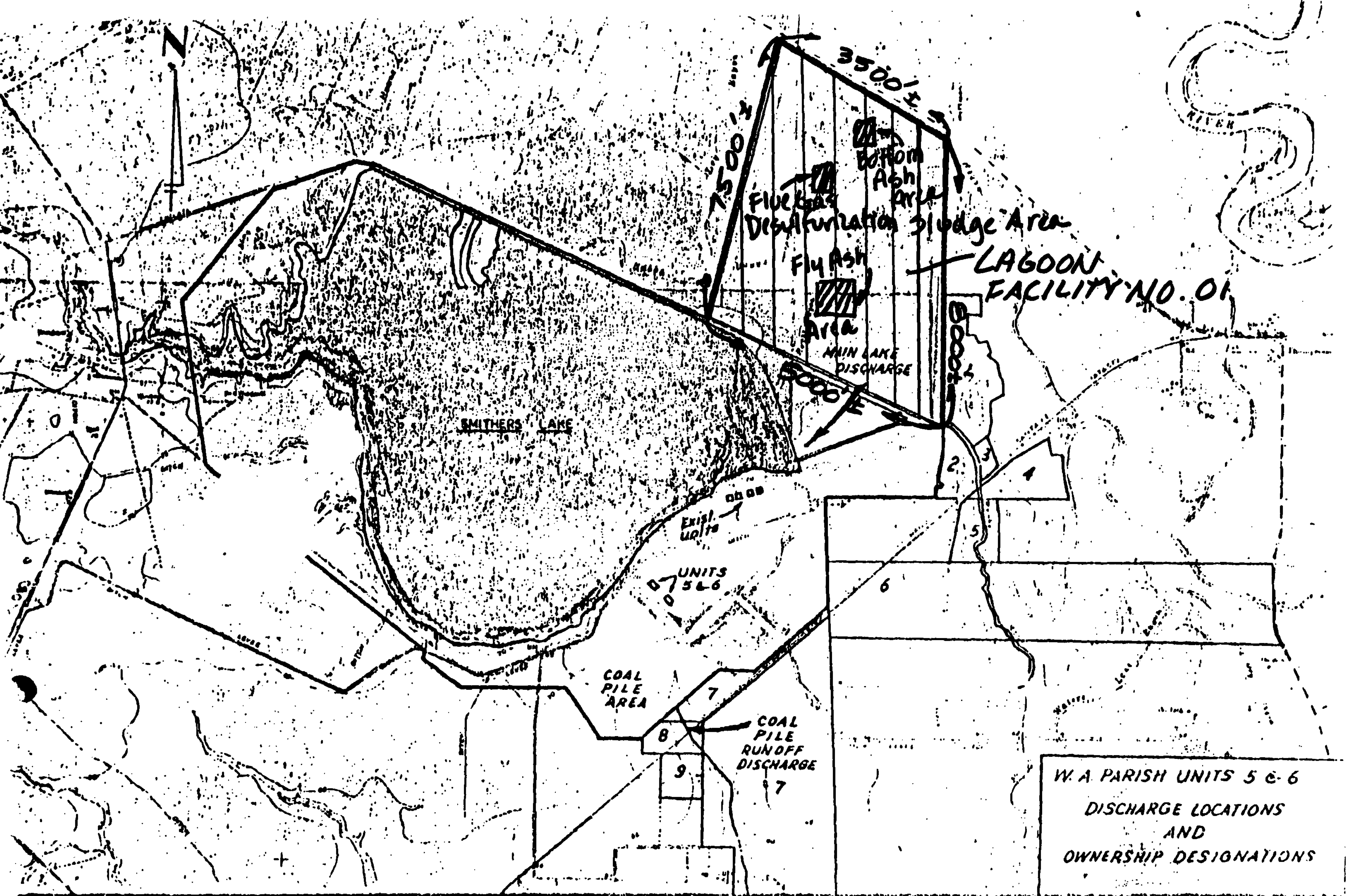
Although the Permit states that the facility is a lagoon, the only lagoon area is for the fly ash disposal. The remaining acreage in the 945 acre permitted facility is dry, and this is where the other wastes are stockpiled.

Noncompliant with Ch. 3 (Surface Water - Non-Point Source Discharge) and Ch. 8 (Floodplains) of the Open Dump Inventory Criteria.

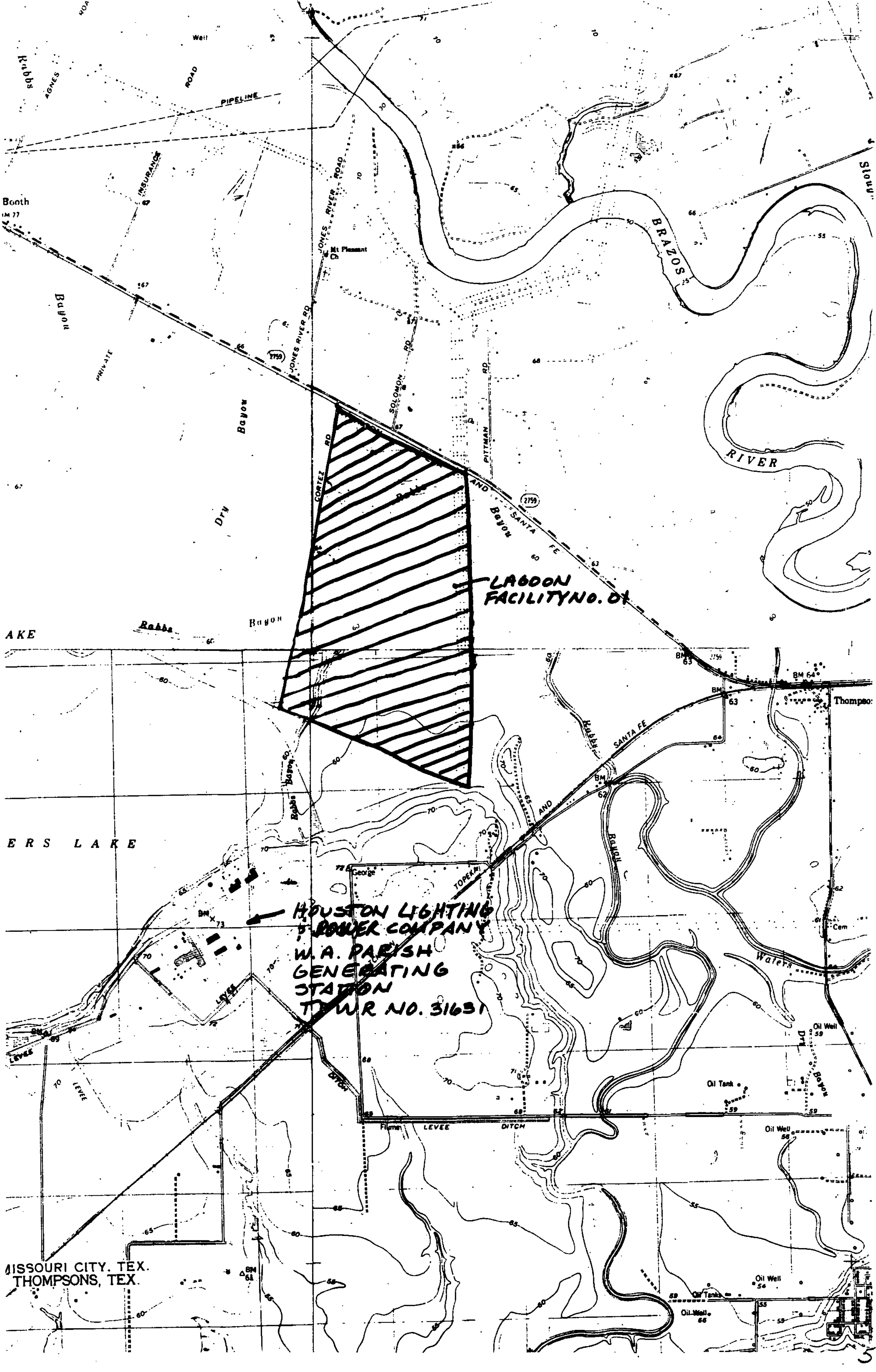
Compliant with all other Criteria.
Low Priority for Ground-Water Monitoring (Ch. 4)

J. Stadler
7-28-83


MAP INDEX
FORT BEND CO., TX
(UNINC. AREA)
COMMUNITY NO. 480228A
JOINS
ATCHISON
TOPEKA
SANTA FE
RR
DRY BAYOU
CORTEZ
ROAD
Bottom Ash Area
Flue Gas Desulfurization
LAGOON FACILITY NO. 01
HL&P TOWR NO. 3463
ROUTE 2759
RABBS
BAYOU
FLY ASH AREA
ZONE A
DITCH
ATCHISON TOPEKA & SANTA FE R.R.
BAYOU
WATERS LAKE BAYOU
ZONE A
JOINS 42



HOUSTON LIGHTING & POWER CO
W. A. PARISH GENERATING STATN
TDWR NO. 31631
LAGOON FACILITY NO. 01
SCALE:



LAGOON FACILITY NO. 01
HOUSTON LIGHTING & POWER COMPANY
W. A. PARISH GENERATING STATION
TDWR NO. 31631
BRAZOS RIVER
Booth
Mt Pleasant Ch
JONES RIVER ROAD
SOLOMON RD
PITTMAN RD
CORTEZ RD
PIPELINE
INSURANCE
AGNES ROAD
Dry Bayou
Rabbs Bayou
SANTA FE
ATCHISON TOPEKA AND SANTA FE
ERS LAKE
George
LEVEE
DITCH
Flamm
Thompsons
Cem
Oil Well
Oil Tank
Oil Tanks
MISSOURI CITY, TEX.
THOMPSONS, TEX.

TDWR OPEN DUMP INVENTORY

SUPPLEMENTARY FACILITY EVALUATION

1. Hazardous Waste Information:

EPA ID No. TXD097311849

Generator	Yes X	No ___
Small-Quantity Generator	Yes ___	No X
Transporter	Yes ___	No X

If yes, state method(s) ______

Treater, Storer, Disposer	Yes ___	No X

2. Verification of TDWR Solid Waste Registration

a. Determine accuracy and completeness of entire computerized registration.

General Information — state any inaccuracies or additions: None

b. Description of Waste Generating Activities — list any inaccuracies or additional SIC code(s) (if known) and manufacturing processes:

None

c. Solid Waste Generation Summary

i. State any inaccuracies: Waste Sequence No. 006: Asbestos should be "on-site/off-site."

ii. Are any additional wastes generated? If so, complete information in this section for each additional waste.

No

d. Solid Waste Management Facilities Summary

i. State any inaccuracies: Facility No. 01: Lagoon does not receive Waste Sequence No. 011 - Demineralizer Base Regeneration Wastewater.

ii. Are any facilities not listed in this section? If so, complete information in Part III - General Facility Information of the ODI Evaluation Summary-for additional facilities.

no

OPEN DUMP INVENTORY FACILITY EVALUATION SUMMARY

I. Instructions

1. Prior to inspection, review registration file for general information.
2. During inspection indicate "N/A" at the end of any question not applicable to existing conditions.
3. Indicate "Unknown" if a pertinent question cannot be comfortably answered.
4. Relevant notations are encouraged but not required.
5. Consult the EPA Classification Guidance Manual (blue notebook) to clarify unclear questions.
6. After inspection, review file to complete form as necessary. Any discrepancy between information in file and existing conditions should be noted on this form.

II. General Company Information

A. Registration/Permit No. 31631

B. Company Name and Mailing Address

Name Houston Lighting and Power Company

Street/Road P.O. Box 1700 - W.F. McGuire

City, State, Zip Code Houston, Texas 77001

County Harris

C. Plant Location

Street/Road Y. U. Jones Road

City, State, Zip Code Thompsons, Texas

County Fort Bend

Site Coordinates: Latitude 29° 31' 47"

Longitude 95° 06' 10"

D. Plant Manager/Operator

Name A. R. Fischer

Title Manager of Energy Production, W.A. Parish Generating Station

Telephone # please contact III.C.

8

III. General Facility Information

A. Registration/Permit No. 31631

B. Sequence No. 01 Type of Facility (landfill, lagoon, etc.) Lagoon

C. Facility Manager/Operator (if different from II.D.)

Name W.F. McGuire

Title Manager: Environmental Protection Department

Telephone # (713) 228-9211

D. Surface Area of Facility 945.868 acres

E. Capacity of Facility has not been determined cubic yds.

F. Classification of waste disposed Class II

G. Description of wastes being managed at the facility. (Including waste sequence number from Notice of Registration)

Waste Sequence No.s 002 - Miscellaneous Inorganic Sludges
004 - Boiler Ash
012 - Demineralizer Regenerant Sludge
016 - Sludge Containing Organics
020 - Fly Ash Mixed With Scrubber Sludge

H. Is facility used for disposal of wastes above grade? no

I. Date facility opened 1978±

J. Status of facility: active (X)

inactive ( ) effective date ________

closed ( ) effective date ________

K. Has facility been deed-recorded? yes

L. Other pertinent observations:

1. Is this disposal facility lined? (Provide details)

In situ clay

Inspected by: Elizabeth L. Whitney

Date Inspected: 6/8/83

Accompanied by: Richard Byc
Ellen Zampello

To Be Completed By TDWR
Chapter 1

AIR

Criterion Compliance Decision

☒ Complies

☐ Does Not Comply

1. Is open burning of solid wastes practiced at the facility?

   ☐ YES (Continue to 2)

   - ☐ Records of previous open burning
   - ☐ Visual observation of open burning
   - ☐ Physical evidence of previous open burning

   ☒ NO (COMPLIES)

   - ☒ Facility is a surface impoundment and does not open burn wastes
   - ☐ Facility is a landspreading operation and does not open burn wastes
   - ☐ Landfill which does not open burn

2. Are residential, commercial, institutional, or industrial solid wastes open burned at the facility? N/A

   ☐ YES (Does not comply)

   - ☐ Records of previous open burning
   - ☐ Visual observation of open burning
   - ☐ Physical evidence of previous open burning

   ☐ NO (Continue to 3)

3. Are landclearing debris, diseased trees, debris from emergency clean-up operations, silvicultural and agricultural wastes, or ordnance open burned at the facility? N/A

   ☐ YES (Continue to 4)

   - ☐ Records of previous burning
   - ☐ Visual observation of open burning
   - ☐ Physical evidence of previous open burning

   ☐ NO (COMPLIES)

4. Does the facility control air emissions in accordance with the State Implementation Plan (SIL) approved or promulgated by the administrator pursuant to Section 110 of the Clean Air Act? N/A

   ☐ YES (COMPLIES)

   - ☐ Opinion given by State agency managing the SIP
   - ☐ Variances or permits under SIP examined
   - ☐ Visual observations of open burning comply with SIP

   ☐ NO (Does not comply)

To Be Completed By TDWR
Chapter 2(a)
SAFETY - EXPLOSIVES GASES
Criterion Compliance Decision
☒ Complies
☐ Does not Comply

1. Is methane generated?

☐ YES (Continue to 2)

- ☐ Landfill with organic waste
- ☐ Surface impoundment generating methane

☒ NO (COMPLIES)

- ☐ Landfill with no organic waste
- ☐ Landfill less than one year old
- ☒ Surface impoundment with no organic waste
- ☐ Landspreading operations

2. Is methane prevented from migrating beyond the property boundary or from accumulating in facility structures? N/A

☐ YES (COMPLIES)

- ☐ No adjacent facility structures
- ☐ Facility located on impervious rock
- ☐ Facility located on saturated soil or surrounded by surface water
- ☐ Facility with gas venting or recovery systems
- ☐ Facility with recent monitoring records showing no migration

☐ NO (Does not comply - continue to 3)

3. Do the concentrations of methane, as determined by monitoring, exceed 25 percent of the LEL in facility structures or the LEL at the property boundary? N/A

☐ YES (Does not comply)

☐ NO (COMPLIES)

11

To Be Completed By TDWR
Chapter 2(b)
SAFETY - FIRES
Criterion Compliance Decision
☒ Complies
☐ Does Not Comply

1. Does the facility have the potential for fire occurrence?

☐ YES (Continue to 2)

☒ NO (COMPLIES)

☒ Facility receives only nonflammable, noncombustible wastes
☐ Other ______________________________

2. Is periodic cover material applied so as to reduce the risk of fire? N/A

☐ YES (COMPLIES)

☐ The facility applies and compacts cover over combustible solid waste at the end of the operating day
☐ The facility applies and compacts cover at least once every 24 hours
☐ The facility incorporates all waste into the soil at the end of the operating day

☐ NO (Continue to 3)

3. Does the facility have adequate operating procedures to control fires should they occur? N/A

☐ YES (COMPLIES)

☐ Landfill minimizes fire hazards by proper operating procedures:

___ High frequency of spreading and compacting all combustible wastes
___ Waste materials with high fire potential are unloaded a safe distance from the working face
___ Unloading of wastes adequately supervised
___ Hot or burning loads are extinguished with water or soil before incorporating into the fill
___ Earth stockpiles are located near the working face
___ Water supply under sufficient pressure is available at the working face
___ Fire extinguishers present on all equipment and buildings
___ Arrangements are established with local fire fighting departments
___ On-site availability of heavy equipment to extinguish fires
___ Firebreaks, fire lanes are present

(The following answer from file review)

___ Previous inspections and reports indicate no problem
___ Permit conditions are being followed (for a fire protection plan)
___ No complaints have been made
___ Records of local fire department indicate no citations have been given

Chapter 2(b)
SAFETY - FIRES
(Continued)

- ☐ Surface impoundment minimizes fire hazards by proper handling and storage of liquid wastes:
  - ☐ Wastes are mixed to reduce flammability
  - ☐ Suitable fire extinguishing equipment is present
  - ☐ Established arrangements with local fire department or trained on-site personnel
  - ☐ Wastes can be rapidly drained or waste flow can be controlled
  - ☐ Waste can be isolated
  - ☐ Impoundment is readily accessible by fire-fighting equipment
- ☐ Landspreading facility minimizes fire hazards by proper operating procedures:
  - ☐ Suitable fire-fighting equipment is available
  - ☐ Established arrangements with local fire department
  - ☐ Facility is readily accessible by firefighting equipment

☐ NO (Does not comply)

To Be Completed By TDWR
Chapter 2(c)
SAFETY - BIRD HAZARDS TO AIRCRAFT
Criterion Compliance Decision
☒ Complies
☐ Does Not Comply

1. Does the facility receive putrescible waste?

☐ YES (Continue to 2)

- ☐ Food waste
- ☐ Sewage sludge, septic tank pumpings
- ☐ Animal manures
- ☐ Animal Carcasses
- ☐ Others

☒ NO (COMPLIES)

2. Is the disposal facility within the specified distances of a public-use airport? N/A

☐ YES (Continue to 3)

- ☐ 10,000 feet from any airport runway used by turbojet aircraft
- ☐ 5,000 feet from any airport runway used by piston-type aircraft

☐ NO (COMPLIES)

3. Does the facility pose a bird hazard to aircraft? N/A

☐ YES (Does not comply)

- ☐ Bird populations at the facility are greater than natural populations in the area
- ☐ Facility attracts birds
- ☐ There is a bird hazard at the airport from areas outside the airport
- ☐ Flight patterns of the birds show that birds do fly from the disposal facility to the airport area

☐ NO (COMPLIES)

- ☐ Bird populations at the facility are less than or equal to the natural populations in the area
- ☐ Facility does not attract birds
- ☐ Bird attraction is due to the airport facility
- ☐ Flight patterns of birds show that they do not fly from the disposal facility to the airport

To Be Completed By TDWR
Chapter 2(d)
SAFETY - ACCESS
Criterion Compliance Decision
☒ Complies
☐ Does Not Comply

1. Is access of unauthorized persons into the facility controlled?

☒ YES (COMPLIES) (Continue to 2)

Natural controls:
- ☐ Trees and hedges
- ☐ Berms and ditches
- ☐ Cliffs and ravines
- ☒ Remoteness

Artificial controls:
- ☒ Gates
- ☒ Fences

☐ NO (Does not comply) (Continue to 2)

2. Are authorized persons controlled within the facility so as to not expose them to potential health and safety hazards?

☒ YES

- ☐ Supervision of the unloading area
- ☐ Adequate lighting
- ☐ Posting information and direct signs
- ☐ Prohibition of scavenging
- ☐ Control of salvaging
- ☐ Trafficable roadways
- ☐ Alternate discharge point
- ☒ Other A contract disposal company manages the principal waste, Seq. no. 020.

☐ NO

15

To Be Completed By TDWR
Chapter 3
SURFACE WATER
Criterion Compliance Decision
☐ Complies
☒ Does Not Comply

1. Is there a point source discharge of pollutants to waters of the United States?

☐ YES (Continue to 2)

___ Facility has a Section 402 (NPDES) permit (Permit No. __________)
___ Landfill with a discharge from a leachate collection system
___ Landfill with a discharge from an on-site leachate treatment system
___ Landfill with a direct discharge of solid waste into waters of the U.S.
___ Surface impoundment with a discharge from a pipe or outfall
___ Surface impoundment with a discharge from an eroded channel
___ Surface impoundment with a discharge from a spillway structure
___ Surface impoundment located in waters of the U.S.
___ Landspreading operations with a discharge from an outfall pipe, or channel that drains the landspreading area where the waste is not incorporated into the soil
___ Landspreading operations located near waters of the U.S. where waste is not applied for enchancement of vegetative growth

☒ NO (Go to 3)

2. Is there a discharge of dredged material or fill material to waters of the U.S.? N/A

☐ Yes (Continue to 3)

☐ NO (Go to 4)

3. Does the facility violate requirements established pursuant to Section 404 of the Clean Water Act?

☐ YES (Does not comply - continue to 5)

___ 404 permit, but is in violation of that permit
___ Facility is in need of a permit and has not applied for a 404 permit

☒ NO (Continue to 5)

_X_ 404 permit not required
___ Facility operates in compliance with its 404 permit
___ Facility has applied for a 404 permit

4. Does the facility violate requirements for NPDES permits established pursuant to Section 402 of the Clean Water Act? N/A

☐ YES (Does not comply)

___ Facility has a 402 permit, but is in violation of that permit
___ Facility has not applied for a 402 permit

16

☐ NO (Continue to 5)

___ Facility operates according to 402 permit requirements

5. Is there a nonpoint source discharge from the facility?

☐ YES (Continue to 6)

___ Surface impoundment with spillover, overtopping, or leakage
___ Other ______

☒ NO (Continue to 6)

___ Landfill or landspreading facility that totally contains runoff or other water
X Other Large permitted area (945 acres) contains all runoff within its area.

6. Does the facility cause nonpoint source polluting of the waters of the U.S. that violates applicable legal requirements implementing an areawide or Statewide water quality management plan that has been developed and approved by the Administrator under Section 208 of the Clean Water Act, as amended?

☒ NO (COMPLIES)

___ Facility not in an area with an approved 208 plan
___ Facility in an area with an approved 208 plan and complies with all applicable requirements
X No 208 requirements have been placed on the facility

☐ YES (Does not comply)

This area is not permitted, and because the FGD and Bottom ash piles are not ~~~~ diked or bermed and are next to Rabbs Bayou, it is probable that runoff is not contained within the area.

— J. Stadler

7-28-83

117

To Be Completed By TDWR
Chapter 4
GROUND WATER
Criterion Compliance Decision
- ☐ Complies
- ☐ Does Not Comply

* See Note Below

1. Does ground water contain more than 10,000 mg/l TDS, and is it not being used as a human drinking water source?

   ☐ YES (COMPLIES)

   - ☐ Ground water has more than 10,000 mg/l TDS, TDS = ________ and is not used as a human drinking water source.
   - ☐ Ground water is not present in usable quantities beneath the site.

   Information source:

   ☒ NO (Continue to 2)

   - ☒ Ground water has less than 10,000 mg/l TDS.
   - ☒ Ground water is being used as a drinking water source.

   Information source: Plant uses water wells.

2. Has an underground drinking water source been contaminated by the facility?

   ☐ YES (Does not comply)

   - ☐ Monitoring shows contamination of a drinking water source. Contaminating substances and concentrations ______________________

   ☐ NO (COMPLIES)

   - ☐ Facility does not overlie a drinking water source
   - ☐ Monitoring shows no contamination beyond the solid waste boundary (or alternate)

   Information source:

   ☒ Not determined A letter from the TDWR stated a monitoring system was not required. — No letter in file - This facility not reviewed by TDWR for ground-water monitoring - 7-28-83 J. Stadler

Low Priority: Water drawn at 90' and 200' ~~fm~~ wells in the vicinity. Site is underlain by alternating sand and clay. Clay layers 10'-30' thick, sand layer 10'-30' thick. Evaporation exceeds (slightly) precipitation in the area.

18

To Be Completed By TDWR
Chapter 5
ENDANGERED SPECIES
Criterion Compliance Decision
☒ Complies
☐ Does Not Comply

1. Is the facility within a critical habitat or an area where endangered or threatened species range?

   ☒ YES (Continue to 2)

   ☐ NO (COMPLIES)

2. Has there been an assessment to determine if the facility has destroyed or adversely changed the critical habitat or contributes to the taking of any endangered or threatened species of plants, fish, or wildlife?

   ☐ YES (COMPLIES)

   - ☐ Facility has passed assessment made by OES or other Federal agency
   - ☐ Facility has an individual 404 Permit with an assessment section
   - ☐ Facility has passed evaluation as a result of settlement made to prevent adverse impact
   - ☐ Nearby assessments have indicated comparable situation at facility is not a problem

   ☒ NO (Continue to 3)

3. Does the facilities presence result in the destruction or adverse modification of the critical habitat?

   Factors to consider:
   Type of critical habitat
   Size of critical habitat
   Sensitivity of critical habitat to adverse impacts
   Critical habitat species characteristics
   Proximity of facility to critical habitat
   Facility design and operational characteristics

   ☐ YES (Does not comply - Continue to 4)

   ☒ NO (Continue to 4)

To Be Completed By TDWR
Chapter 5
ENDANGERED SPECIES
(Continued)

4. Does the facility cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife?

Factors to consider:
Type of species and species habitat
Species characteristics
Sensitivity of species and species habitat to adverse impacts
Facility size, design, and operational characteristics

Adverse impacts to consider:
Harrassing, harming,pursuing, hunting, wounding, killing, trapping, capturing, or collecting species (direct violation of ESA, does not comply)
Adverse modification or loss of habitat (including air & water pollution)
Infringement on breeding, nesting, and feeding activities
Interference with species movement

☐ YES (Does not comply)

☒ NO (COMPLIES)

Endangered Species - Fort Bend County

Red Wolf
Ocelot
Brown Pelican
Bald Eagle
Attwater's Prairie Chicken
Whooping Crane
Red Cockaded Woodpecker
American Alligator
Houston Toad

To Be Completed by TDWR
Chapter 6(a)
DISEASE: VECTORS
Criterion Compliance Decision
☒ Complies
☐ Does Not Comply

1. Is the facility a potential breeding ground for rodents, flies, or mosquitoes which poses a threat to public health?

☐ YES (Continue to 2)

☒ NO (COMPLIES)

2. Does the facility minimize the on-site population of disease vectors through the periodic application of cover material or other techniques as appropriate so as to protect public health? N/A

☐ YES (COMPLIES)

☐ Facility applies daily cover.
Facility practices other techniques:
☐ Repellents
☐ Insecticides or rodenticides
☐ Composting or processing
☐ Predatory or reproductive control
☐ Other ______________________

☐ NO (Does not comply)

Comment ______________________

To Be Completed By TDWR
Chapter 6(b)

SEWAGE SLUDGE AND SEPTIC

TANK PUMPINGS

Criterion Compliance Decision

☒ Complies

☐ Does Not Comply

1. Are sewage sludge or septic tank pumpings applied to the surface of the land or incorporated into the soil?

   ☐ YES (Continue to 2)

   ☒ NO (COMPLIES)

   ☐ Facility is a trenching or burial operation
   ☒ Facility receives no sewage sludge or septic tank pumpings.

2. Are crops planted for human consumption within 18 months after application of waste? N/A

   ☐ YES (Continue to 3)

   ☐ Crops grown at time of inventory are for human consumption
   ☐ Information from operating plan
   ☐ Past usage or crops in the vicinity
   ☐ Information from facility owner/operator

   ☐ NO (Continue to 5)

3. Does the waste contact the food portion of the crop? N/A

   ☐ YES (Continue to 4)

   ☐ Direct application or rainfall splash
   ☐ Crops with food portion close to the ground
   ☐ Taller crops that receive application early in growing stage

   ☐ NO (Continue to 6)

4. Is the waste treated by a process to further reduce pathogens? N/A

   ☐ YES (COMPLIES)

   ☐ Verification of acceptable process from appropriate source
   Source used ______________________________

   ☐ NO (Does not comply - continue to 5)

   ☐ Verification cannot be made

Chapter 6(b)

SEWAGE SLUDGE AND SEPTIC

TANK PUMPINGS

(Continued)

5. Is sewage sludge the waste material being applied? N/A

☐ YES (Continue to 6)

☐ NO (Continue to 7)

6. Has the sludge been treated by a process to significantly reduce pathogens and is access controlled - 12 months for the public, and 1 month for grazing animals whose products are consumed by man? N/A

☐ YES (Both reduction process and access control must be checked) (COMPLIES)

☐ Verification of acceptable process from appropriate source
Source used ______________________

☐ Appropriate access controls are used in public access areas

☐ Facility is on private farmland not subject to frequent trespass

☐ NO (Does not comply)

☐ Verification cannot be made

☐ No access controls are used

☐ Facility is on private farmland subject to frequent trespass, and access is not controlled

7. Has the waste been treated by a process to significantly reduce pathogens or is access prevented - 12 months for the public and 1 month for grazing animals whose products are consumed by man? N/A

☐ YES (COMPLIES)

☐ Verification of acceptable process from appropriate source
Source used ______________________

☐ Access controlled

☐ NO (Does not comply)

To Be Completed By TDWR
Chapter 7
APPLICATION TO LAND USED FOR THE
PRODUCTION OF FOOD CHAIN CROPS
Criterion Compliance Decision
☒ Complies
☐ Does Not Comply

1. Is solid waste injected, spread or plowed into land used for food chain crops?

☐ YES (Continue to 2)

☒ NO (COMPLIES)

____ The land is not used for the production of food chain crops
_X_ Facility is a surface impoundment
____ Facility is a landfill

2. Is the cadmium concentration in the waste less than 2 mg/kg? N/A

mg/kg - cadmium concentration __________

☐ YES (Continue to 4)

☐ NO (Continue to 3)

3. Is the pH of the soil/waste mixture 6.5 or greater at the time of application? N/A

☐ YES (Continue to 4)

☐ NO (Does not comply)

4. Is the annual application rate of cadmium in excess of 2 kg/ha for food chain crops used for human consumption? N/A

kg/ha/yr cadmium application rate ________ (see Figure 7-3)

☐ YES (Does not comply)

☐ NO (Continue to 5)

5. If waste is applied to land used for the production of tobacco, leafy vegetables or root crops for human consumption, is the cadmium loading rate less than 0.5 kg/ha/yr? N/A

Crop grown ____________

☐ YES (Continue to 6)

____ Land is not used for production of these crops
____ Cadmium loading is less than 0.5 kg/ha/yr

☐ NO (Does not comply)

24

Chapter 7
APPLICATION TO LAND USED FOR THE PRODUCTION OF FOOD CHAIN CROPS
(Continued)

6. Does the soil cadmium concentration exceed 5 kg/ha with a CEC of less than 5, or 10 kg/ha with a CEC of 5 to 15 or 20 kg/ha with a CEC greater than 15 (for background soil pH 6.5-crops for human consumption)? N/A

☐ YES Does not comply)

☐ NO (Go to 7)

7. Has the cumulative application of cadmium exceeded 5 kg/ha? N/A
(Soil pH 6.5-crops for human consumption)

kg/ha cadmium in soil ________
kg/ha cumulative application ________

☐ YES (Does not comply)

☐ NO (Continue to 12)

8. Is the soil pH maintained at 6.5 or higher whenever animal feed crops are grown? N/A

☐ YES (Continue to 10)

____ SCS maps or reports, or local agricultural extension service
Laboratory analysis
____ pH of soil is controlled whenever animal feed crops are grown

☐ NO (Does not comply)

9. Is the solid waste and soil mixture at pH 6.5 or greater at the time of solid waste application or at the time the crop (animal feed) is planted, whichever occurs later? N/A

☐ YES (Continue to 10)

☐ NO (Does not comply)

10. Is there an operating plan which demonstrates how the animal feed is to be distributed to preclude ingestion by humans and provides safeguards to prevent possible health hazards resulting from alternative future uses of the land? N/A

☐ YES (Continue to 11)

____ Crop distribution is controlled to prevent ingestion by humans
____ Operating plan describes safeguards against possible entry of cadmium into food chain
Description ______________________________

☐ NO (Does not comply)

25

Chapter 7
APPLICATION TO LAND USED FOR THE
PRODUCTION OF FOOD CHAIN CROPS
(Continued)

11. Does a notice appear in the land records notifying any future owners that the property has received solid waste at high cadmium application rates and that human food chain crops should not be grown, due to a possible health hazard? N/A

☐ YES (Continue to 12)

☐ NO (Does not comply)

12. Does the waste contain concentrations of PCBs equal to or greater than 10 mg/kg? N/A

☐ YES (Continue to 13)

____ Analysis indicates 10 mg/kg or more

☐ NO (COMPLIES)

____ Analysis indicates less than 10 mg/kg
____ No known significant source of PCBs

13. Is the waste incorporated into the soil? N/A

☐ YES (Continue to 14)

☐ NO (Does not comply)

14. Is the milk or animal feed monitored to assure that the PCB concentrations are less than 1.5 mg/kg (fat basis) in milk, or less than 0.2 mg/kg in animal feed? N/A

☐ YES (COMPLIES)

☐ NO (Does not comply)

To Be Completed By TDWR
Chapter 8
FLOODPLAINS
Criterion Compliance Decision
☐ Complies
☒ Does Not Comply

1. Is the solid waste applied to the land surface and incorporated into the soil at such a frequency that it is not subject to washout?

☐ YES (Complies) (Continue to 2)

- ☐ Waste incorporated into the soil in accordance with requirements of Section 257.3-5
- ☐ Waste used as a soil conditioner or fertilizer
- ☐ Disposal area being used (or will be used next season) for vegetation

☒ NO (Continue to 2)

2. Is the facility located in the 100-year floodplain?

☒ YES (Continue to 3) (Provide copy of floodplain map and unit location)

The permit application states that the facility is not in the 100-year floodplain

- ☐ Stated in permit or operation applications
- ☐ State floodplain designation
- ☒ Federal floodplain designation: Agency FIA / FEMA
- ☐ Interpolation between two known points in the 100-year floodplain
- ☐ Computations of flood flow and flood level

☐ NO (Complies)

3. Does the facility restrict the flow of the base flood or reduce the temporary water storage capacity so as to pose a hazard to human life, wildlife, or land or water resources?

Special cases:

Facility located in a state where equivalent review or permit procedures have considered flood alteration impacts
Facility has a 404 permit with an equivalent flood hazard assessment section and is in compliance with the permit
Facility has filled floodplain or is diked up to or above base flood level
Facility is below floodplain grade

Facility located in a floodplain where the channel is diked to contain the base flood
Facility increases base flood level more than 1.0 foot

Factors considered in flood hazard potential assessment:

Base Flood characteristics
Floodplain topography
Floodplain hydrogeology
Facility characteristics
Natural resources in and adjacent to the floodplain
Land use in and adjacent to the floodplain

☐ YES (Does not comply - continue to 4)

☒ NO (Continue to 4)

4. Is the facility protected from washout by the base flood so as not to pose a hazard to human life, wildlife, or land or water resources?

Factors considered for washout protection:

Types and Efficiency Protection:
- ☐ Dike or levee (height = ________)
- ☐ Berm (height = ________)
- ☐ Flexible linings
- ☐ Vegetative cover
- ☐ Riprap
- ☐ Diversion of surface flow
- ☒ Change in soil matrix
- ☐ Flood flow velocity
- ☐ Other ________________________
- ☐ None

☐ YES (Complies)

- ☐ State washout assessment or 404 permit
- ☐ Site analysis of washout protection

☒ NO (Does not comply)

- ☐ Washout by flood of lesser magnitude than the 100-year flood
- ☒ Site analysis of washout protection

28

Reference 11

31631

The Light company Houston Lighting & Power P.O. Box 1700 Ho

September 20, 1982
PA-HL-TX-2001

Mr. Jay Snow, P.E., Chief
Solid Waste Section
Texas Department of Water Resources
P. O. Box 13087, Capitol Station
Austin, Texas 78711

Dear Mr. Snow:

SUBJECT: W. A. PARISH GENERATING STATION
TDWR REGISTRATION NO. 31631
DISPOSAL OF STABILIZED FLUE GAS DESULFURIZATION WASTES

Houston Lighting and Power is scheduled to begin trial operation of Unit 8 at the W. A. Parish station on November 1, 1982. Unit 8 will utilize a flue gas desulfurization (FGD) system to remove sulfur dioxide from the flue gas. The sludge produced by the FGD system will be stabilized with fly ash and disposed of on-site, in the existing Class I disposal area (TDWR Registration No. 31631). The stabilized FGD sludge will be monitored to aid in evaluating long term disposal options. The data generated by this monitoring program will be made available to the TDWR for review.

Should you have any question regarding this request, please contact Mr. R. D. Groover at (713)486-2726 or Mr. R. T. Bye at (713)486-2706.

Sincerely,

W. McGuire

W. R. McGuire
Manager
Environmental Protection Department

JWS/jr
Attachments

FLUE GAS DESULFURIZATION SYSTEM

MANAGEMENT PLAN

FOR

HOUSTON LIGHTING & POWER COMPANY

W. A. PARISH STATION

UNIT 8

2

GENERAL

On November 1, 1982, trial operation of W. A. Parish Unit 8 is scheduled to commence. Unit 8 is a 550 MW coal fired unit which will utilize a wet limestone flue gas desulfurization (FGD) system for the removal of sulfur dioxide from the flue gas. The sludge produced by the FGD system will be dewatered and then blended with fly ash to stabilize the sludge. The stabilized sludge generated by this process will be disposed of in the existing disposal area at the W. A. Parish site. This disposal area has been registered as a Class I disposal site with the Texas Department of Water Resources (TDWR Registration No. 31631). This disposal area will be utilized until a permanent long term disposal area can be developed for the stabilized sludge. It is anticipated that the physical properties of the stabilized sludge will enable its' use as a pond liner for future disposal sites in place of clay soils or plastic liners. As this sludge is disposed of, it will be tested for physical and chemical properties and data will be presented to the Texas Department of Water Resources (TDWR) for review.

PROCESS DESCRIPTION

W. A. Parish Unit 8 will utilize a wet limestone FGD system to remove sulfur dioxide from the flue gas. Spent limestone slurry will be transported from the FGD system absorbers to a thickener for processing. The sludge from the thickener should contain approximately 25% solids. Thickener underflow (sludge) is then transferred to the secondary dewatering system (rotary vacuum filters) for further dewatering. The vacuum filters are designed to dewater the sludge at a rate of 165 tons per hour to 44% - 69% solids. From the vacuum filters the sludge will be transferred via conveyor belts to mixing devices (pug mills) where it will be blended with fly ash to produce a stabilized waste product. In the event that there is not enough fly ash available from Unit 8 to achieve the desired stabilization, fly ash from Unit 7 can be added. As the boilers for Units 7 and 8 are identical and the coal used should be similar, there should be no change in the physical or chemical properties of the stabilized sludge resulting from the utilization of fly ash from Unit 7 in the blending process. Provisions have been made for chemical addition into the pug mills to aid in the stabilization processes as necessary. The FGD sludge handling system was designed with adequate standby equipment to insure proper handling at all times while Unit 8 is in operation. Refer to the attached drawing for a Process Flow Diagram of the Sludge Handling System.

WASTE CHARACTERIZATION

The quality of the stabilized FGD sludge produced will depend largely on the chemical characteristics (ash and sulfur content) of the coal burned.

Coal

The coals which are currently being utilized at the W. A. Parish station are western sub-bituminous coals from the Powder River Basin. See Tables 1-4 for chemical analyses of these coals. Unit 8 will most probably utilize a blend of these coals. The analyses show that these coals result in similar sulfur loadings (lbs/10^6Btu) and should produce similar sludge quantities. Should different fuels be purchased in the future, they will be comparable in quality to the above (See Table 1-4) and will most likely be utilized in a blend with existing coals.

Fly Ash

Fly ash will provide 30 percent or more of the final stabilized FGD sludge. Therefore, the properties of the fly ash will play an important role in the characteristics of the stabilized sludge. Results of analyses performed on fly ash generated by the combustion of various blends of coal currently being burned at the W. A. Parish station were transmitted to the TDWR on April 15, 1982. This information was provided in support of reclassification of the fly ash to a Class II material. With the exception of the higher levels of Na_2O in the NERCO Coal, the fly ashes produced by the coals used at the W. A. Parish station are very similar. Tables 5-8 give a comparative analysis of the fly ash expected from the fuels.

Limestone

A limestone slurry will be utilized in the FGD system for removal of the sulfur dioxide from the flue gas. The limestone used in the slurry will have the characteristics outlined in Table 9. Water used as make-up for the slurry will come from either the Brazos River or, if this is not available, well water. A comparison of the important constituents of these two waters is found in Table 10. The FGD system is designed to operate using either water sources as make-up for the limestone slurry. Provisions may also be made to utilize the calcium carbonate sludge produced by the Units 7 and 8 make-up water treatment system. The flow from the make-up water system will be seasonal and, at its maximum, contain the constituents outlined in Table 11.

Scrubber Sludge

The sludge from the FGD system thickener forwarded to secondary dewatering will consist primarily of calcium carbonate, calcium sulfite, calcium sulfate and inerts. The expected levels of these compounds are included in Table 12 along with other expected characteristics of the sludge.

Stabilized Sludge

When the fly ash and FGD system sludge are blended, a chemical reaction occurs similar to that experienced when concrete is cured. The physical properties of this stabilized sludge will depend on the characteristics of the fly ash and the sludge that will be blended. Studies have shown that the pozzolanic properties of the stabilized sludge can be controlled to some degree by the addition of chemicals into the pug mills, but the system would normally be used only for the preparation of a liner grade material (i.e., permeability 10^6 - 10^7 cm/sec).

Production Rates.

Sludge production will be a function of the fuel sulfur loading as well as the quantity of liquid blowdown from the FGD system. The liquid blowdown may be needed to control the chloride level in the FGD system. Tables 13 and 14 provide a range of expected production rates of the blended sludge that will be produced during the operation of Unit 8. Also included are the production rates of the major components that will comprise the blended sludge.

OPERATION AND DISPOSAL

The FGD waste handling facilities will normally be operated for 8 hours each day. This will be sufficient time to process the sludge which has been produced over a 24 hour period. This schedule can be altered as needed to accommodate changes in the quantity of sludge produced.

The blended sludge will be transferred via conveyors to the stack-out hopper where it will be loaded onto trucks for transporting to the disposal area. In the event that trucks are not available when the blended sludge is produced, the sludge will be temporarily stored in the stackout area and loaded onto trucks when they become available. This entire area is lined with concrete and curbed to contain the sludge and prevent the discharge of any rainfall runoff.

Any rainfall runoff from this area will be drained to the emergency sludge storage pond, where it will either be utilized in the FGD system or transferred to the low volume waste treatment system for treatment. Design specifications for the emergency sludge pond and disposal area were approved by the TDWR in their letter dated September 4, 1981 (See Attachment A). The trucks will dispose of the blended sludge in the fly ash landfill.

During the initial stages of sludge disposal, a comprehensive sampling program will be instigated to determine the physical and chemical properties of the stabilized sludge. This data will be used to ascertain the requirements for a long term disposal area and could potentially allow utilization of the stabilized sludge for a pond liner. The areas to be utilized for disposal of the stabilized sludge is constructed and registered with the TDWR as a Class I disposal site. It is protected with a minimum of 3 feet of compacted clay soil and is diked to contain rainfall runoff. Storage capacity will be provided for rainfall resulting from a 10 year, 24 hour storm. It is not anticipated that there will be any discharge of runoff water from the storage pond as this water will be used for dust suppression within the landfill. This practice would, therefore, constantly be providing adequate storage volume in the pond.

Table 1

COAL ANALYSIS

Parameter % by Weight	Kerr McGee Coal Jacobs Ranch Mine	
	Average	Range
o HHV, Btu/lb	8,476	8,000-8,785
o Proximate Analysis		
Moisture	28.87	25.98-31.30
Ash	5.87	4.77- 8.12
Volatile Matter	31.35	28.42-33.36
Fixed Carbon	33.91	31.82-37.04
Sulfur	0.49	0.20-0.76
o Ultimate Analysis		
Moisture	28.87	27.39-30.80
Ash	5.87	4.77-10.00
Sulfur	0.48	0.34-0.79
Nitrogen	0.71	0.67-0.78
Carbon	48.61	45.05-50.98
Hydrogen	3.56	3.10- 3.81
Oxygen	11.99	10.40-14.02
Chlorine	0.01	0.01- 0.01

Table 2

COAL ANALYSIS

Parameter % by Weight	NERCO Coal Spring Creek Mine Average	Range
o HHV, Btu/lb	9,407	8,800-9,636
o Proximate Analysis		
Moisture	24.50	21.17-27.67
Ash	3.63	2.26- 6.00
Volatile Matter	31.83	28.80-34.61
Fixed Carbon	40.04	36.54-43.64
Sulfur	0.33	0.08- 0.60
o Ultimate Analysis		
Moisture	24.50	21.17-27.67
Ash	3.63	2.26- 6.00
Sulfur	0.33	0.08- 0.60
Nitrogen	0.68	0.35- 0.95
Carbon	54.64	50.91-58.11
Hydrogen	3.79	3.47- 4.09
Oxygen	12.42	10.38-14.94
Chlorine	0.01	0.00- 0.03

Table 3

COAL ANALYSIS

Exxon Coal USA, Inc.
The Carter Mining Company
Anticipated Coal Quality

	Rawhide Mine	
Proximate Analyis,Wt. %	Average	Range
Moisture	30.50	
Ash	5.18	4.06- 6.30
Volatile Matter	31.05	30.06-32.04
Fixed Carbon	33.27	32.08-34.46
BTU per Pound	8227	8062-8392
Sulfur	0.34	0.19- 0.49
Ultimate Analyis,Wt. %		
Moisture	30.50	
Carbon	48.07	46.83-49.29
Hydrogen	3.31	3.21- 3.41
Nitrogen	0.70	0.64- 0.76
Sulfur	0.34	0.19- 0.49
Ash	5.18	4.06- 6.30
Oxygen	11.90	11.22-12.58

Table 4

COAL ANALYSIS

Exxon Coal USA, Inc.
The Carter Mining Company
Anticipated Coal Quality

	West Caballo Mine	
Proximate Analysis, Wt. %	Average	Range
Moisture	30.10	
Ash	5.23	4.59- 5.87
Volatile Matter	31.27	30.61-31.93
Fixed Carbon	33.40	32.54-34.26
BTU per Pound	8330	8135-8524
Sulfur	0.33	0.29- 0.37
Ultimate Analysis, Wt. %		
Moisture	30.10	
Carbon	48.58	47.92-49.24
Hydrogen	3.44	3.35- 3.53
Nitrogen	0.71	0.65- 0.77
Sulfur	0.33	0.28- 0.37
Ash	5.23	4.59- 5.87
Oxygen	11.61	11.22-12.00

Table 5

FLY ASH ANALYSIS

Parameter % by Weight	Kerr McGee Jacobs Ranch Mine Average	Range
o Ash Fusion Temperature		
Initial	2,167	2,054-2,282
Softening	2,209	2,090-2,326
Hemispherical	2,258	2,156-2,371
Fluid	2,328	2,234-2,452
o Hardgrove Grindability	52	47.7-60.3
o Ash Analysis		
P2O5	0.49	0.10- 0.92
Sio2	29.14	22.38-34.93
Fe2O3	7.09	0.60-12.18
Al2O3	16.25	11.94-20.68
TiO2	1.61	1.02- 4.05
CaO	24.01	16.98-34.28
MgO	4.46	3.10- 5.81
K2O	0.38	0.16- 0.92
Na2O	1.54	0.38- 3.70
SO3	12.98	9.73-18.96
Undetermined	2.06	0.90- 7.77

Table 6

FLY ASH ANALYSIS

Parameter % by Weight	NERCO Coal Spring Creek Mine	
	Average	Range
o Ash Fusion Temperature		
Initial	2,079	1,940-2,220
Softening	2,114	1,990-2,240
Hemispherical	2,124	2,000-2,290
Fluid	2,169	2,020-2,340
o Hardgrove Grindability	50	39-64
o Ash Analysis		
P_2O_5	0.36	0.00- 0.62
SiO_2	26.72	14.10-40.64
Fe_2O_3	4.77	1.03-12.26
Al_2O_3	17.88	13.10-23.44
TiO_2	1.09	0.62- 1.52
CaO	18.14	12.36-22.42
MgO	4.50	1.74- 8.31
K_2O	0.66	0.00- 1.61
Na_2O	8.39	2.38-14.68
SO_3	16.52	8.64-25.19
Undetermined	0.97	0.00- 2.64

Table 7

FLY ASH ANALYSIS

Exxon Coal USA, Inc.
The Carter Mining Company
Anticipated Fly Ash Quality

	Rawhide Mine	
	Average	Range
Mineral Analysis of Ash, Wt. %		
P_2O_5	0.80	0.44- 1.16
SiO_2	31.36	26.45-36.27
Fe_2O_3	6.06	4.75- 7.37
Al_2O_3	14.69	12.54-16.84
TiO_2	0.94	0.77- 1.11
CaO	22.74	19.68-25.80
MgO	5.43	4.59- 6.27
SO_3	16.83	13.07-20.59
K_2O	0.28	0.12- 0.44
Na_2O	0.87	0.30- 1.44
Alkalies as Na_2O, Wt. % (D.C.B.)	0.08	0.04- 0.12
Fusion Temperatures of Ash, $^{\circ}F$		
Reducing		
ID	2151	2088-2214
H-W	2179	2124-2234
H-W/2	2190	2135-2245
Fluid	2204	2149-2259
Oxidizing		
ID	2190	2146-2234
H-W	2217	2175-2259
H-W/2	2228	2185-2271
Fluid	2240	2195-2285

Table 8

FLY ASH ANALYSIS

Exxon Coal USA, Inc.
The Carter Mining Company
Anticipated Fly Ash Quality

	West Caballo Mine	
	Average	Range
Mineral Analysis of Ash, Wt. %		
P_2O_5	0.99	0.74- 1.24
SiO_2	32.26	28.25-36.27
Fe_2O_3	5.04	4.45- 5.63
Al_2O_3	16.85	15.27-18.45
TiO_2	1.27	1.17- 1.37
CaO	23.33	20.68-25.98
MgO	4.06	3.65- 4.47
SO_3	14.52	10.72-18.32
K_2O	0.30	0.17- 0.43
Na_2O	1.37	1.02- 1.72
Alkalies as Na_2O, Wt. % (D.C.B.)	0.12	0.09- 0.15
Fusion Temperatures of Ash, ^oF		
Reducing		
ID	2120	2065-2175
H-W	2145	2095-2195
H-W/2	2155	2105-2205
Fluid	2185	2120-2250
Oxidizing		
ID	2175	2135-2215
H-W	2195	2155-2235
H-W/2	2205	2165-2245
Fluid	2245	2180-2310

Table 9

LIMESTONE COMPOSITION

	As Received	Crushed
o Grindability	Bond Index of 12	- - -
o Size (Max.)	4-inch to fines	80% Minus 3/8" 100% Minus 3/4"
o Bulk Density	100 lbs./cu.ft.	100 lbs./cu.ft.
o Hardness	3 MHO scale	- - -
o Angle of repose	30 degrees	38 degrees
o Surcharge angle	20 degrees	20 degrees
o Composition		
Calcium Carbonate	95%	
Silicon Dioxide	<1%	
Iron Dioxide	<1%	
Aluminum Oxide	<1%	
Magnesium Oxide	<1%	

Table 10

Water for Limestone Preparation

	Utility	Service
Constituent in PPM	*Brazos River Water	Well Water
Calcium	144	119
Magnesium	36	15
Sodium	111	40
Bicarbonate	127	113
Carbonate	0	0
Hydroxide	0	0
Chloride	107	11
Sulfate	56	50
Nitrate	1	1
Carbon Dixoide, Free	∿7.5	
Silica	8.4	11
pH	∿7.5	
Total Dissolved Solids	412	300

*Flow Weight Average 1965-1971

Table 11

CALCIUM CARBONATE SLUDGE

Constituent	Quantity (lb/Day Dry)
$CaCO_3$	166,820
$Mg(OH)_2$	5,290
$AL(OH)_3$	1,660
Polelectrolytes	180
SiO_2 & Misc.	4,980
Total	178,930

Note: Flow will be from a clarifier underflow in the form of a 12 per-cent solids stream.

Table 12

EXPECTED SCRUBBER SLUDGE CHARACTRERISTICS

$CaCO_3$	$<$ 10% by wt. (dry)
$CaSO_3$, 1/2 H_2O	65% to 80% by wt. (dry)
$CaSO_4$, $2H_2O$	20% to 35% by wt. (dry)
Slurry pH	5.0 - 6.5
Specific Gravity	1.06 - 1.1
Temperature	130F - 140F
Chloride Content	4000 - 6000 ppm
Inerts	5 - 8%

Note: Although no magnesium will be added to the limestone reagent, the limestone may contain < 1% MgO and the makeup water has a magnesium content of 15-36 ppm.

Table 13

FLY ASH AND FGD SLUDGE PRODUCTION RATES

	Kerr McGee Jacobs Ranch Mine	
	Minimum	Maximum
Fuel HHV, Btu/lb	8121	8785
Ash Content, %	See Table 1	See Table 1
Sulfur Content %	0.2	0.76
Fly Ash Generated, TPH	12.50	21.92
SO_2 Generated, LB/MMBtu	0.85	1.80
SO_2 Removed in Scrubber, TPH	1.61	3.63
Limestone Consumed, TPH	3.04	6.86
Sludge @ 25% Solids, TPH	18.6	42.0
Sludge @ 25% Solids, Ft^3/HR	423	953
Sludge @ 70% Solids, TPH	6.64	15.0
Sludge @ 70% Solids, Ft^3/HR	132.8	300.0
Fly Ash Required, TPH	3.72	20.96
Final Mixed Sludge, TPH	10.46	44.92
Final Mixed Sludge, Ft^3/HR	209.2	898.4

Table 14

FLY ASH AND FGD SLUDGE PRODUCTION RATES

	NERCO Spring Creek Mine	
	Minimum	Maximum
Fuel HHV, Btu/lb	8800	9636
Ash Content, %	See Table 2	See Table 2
Sulfur Content, %	0.08	0.60
Fly Ash Generated, TPH	5.40	15.70
SO_2 Generated, LB/MMBtu	0.18	1.20
SO_2 Removed in Scrubber, TPH	0.36	2.42
Limestone Consumed, TPH	0.68	4.57
Sludge @ 25% Solids, TPH	4.16	28.0
Sludge @ 25% Solids, Ft^3/HR	95	636
Sludge @ 70% Solids, TPH	1.49	9.99
Sludge @ 70% Solids, Ft^3/HR	298	199.8
Fly Ash Required, TPH	0.81	13.98
Final Mixed Sludge, TPH	2.28	29.96
Final Mixed Sludge, Ft^3/HR	45.6	599.2

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

September 4, 1981

Mr. W.F. McGuire, Mgr.
Houston Lighting & Power Co.
Environmental Protection Dept.
P.O. Box 1700
Houston, Texas 77001

Re: W.A. Parish S.E.S. - TDWR Permit No. 01038

Dear Mr. McGuire:

The Texas Department of Water Resources staff has reviewed your data, plans and drawings concerning pit and pond construction submitted with your letter of May 29, 1981. It is our opinion that your pond construction method is in compliance with Provision 12 of your permit, which provides for groundwater protection.

Sincerely,

JC Newell

J.C. Newell, P.E.
Chief, Wastewater Section
Permits Division

RFS:pj

cc: TDWR District 7.

RECEIVED
SEP 9 1981
W. F. McGUIRE

Reference 12

SW Reg 31631

Received TDWR
Oct 31, 1983 RRA

GEOTECHNICAL INVESTIGATION
ASH STORAGE AREA
W.A. PARISH GENERATING STATION

Report to

HOUSTON LIGHTING & POWER COMPANY
Houston, Texas

McClelland engineers, inc.
geotechnical consultants

MEMORANDUM REPORT

McClelland engineers, inc. / geotechnical consultants

6100 HILLCROFT / HOUSTON, TEXAS 77081
TEL. 713 / 772-3701 . TELEX 762-447

SUBJECT: Geotechnical Investigation
Ash Storage Area
W. A. Parish Generating Station

DATE: July 28, 1976

REPORT NO.: 0176-220-2

TO: Houston Lighting & Power Company
P.O. Box 1700
Houston, Texas 77001

Attention: Mr. James Malinak

Introduction

Submitted here is the report on our geotechnical investigation conducted at the proposed site for ash storage at the W. A. Parish Generating Station near Thompsons, Texas. This study was conducted in general accordance with our letter proposal dated June 15, 1976 and was authorized by your Purchase Order No. L-53980, dated June 29, 1976.

Project Description. Houston Lighting & Power Company is planning the construction of ash storage areas at its W. A. Parish Generating Station near Thompsons, Texas. The proposed site is located in an 800-acre tract just north of Smithers Lake as shown on Plate 1. We understand that several containment areas surrounded by earth embankments are anticiapted to store ash waste generated by the coal fired units at Parish Station; however, the exact locations of the storage areas have not been established.

Purpose and Scope of Study. The purposes of this investigation were to determine the general subsurface conditions in the 800-acre site and develop recommendations for design and construction that will minimize seepage of storm runoff outside of the containment areas. Information on subsurface conditions was provided by undisturbed-sample borings drilled to determine soil stratigraphy and to obtain soil samples. Additional soils data were provided by five undisturbed-sample borings completed prior to this study. Laboratory tests were performed on selected samples recovered from the borings to determine pertinent physical properties of the soils. Design and construction considerations were developed from all the field and laboratory data.

Principal Findings. The principal findings and conclusions of this study are as follows:

(1) The soil borings disclose relatively uniform soil conditions throughout the 800-acre tract that consist primarily of highly plastic clays of CH classification to about 35-ft depth underlain by silty fine sand to the maximum depth explored, 60 ft. Layers of silty clay (CL) and silt (MH-ML) of varying depths and thicknesses are found in some borings. Measurements of the depth to water in the boreholes suggest the groundwater level may be 8 to 10 ft below the surface, approximately El 52.

(2) Laboratory permeability tests were performed on two samples of silty clay (CL) to obtain what we believe would be an estimate of the maximum permeability of the silty clay soils present at the site. The test results indicate the coefficient of permeability for CL soils may range from 2.25×10^{-6} to 2.76×10^{-8} cm per sec, depending on soil plasticity characteristics and void ratio. Our previous experience with soils having properties similar to the near surface CH-CL soils which dominate the site, indicates these materials should have a coefficient of permeability of 1×10^{-7} cm per sec or lower in their natural state. We would expect the permeability to be of the same order of magnitude, or lower, when the CH-CL soils are compacted at a moisture content slightly above optimum and to a dry density of 95 percent of the maximum dry density determined in accordance with ASTM D 698-70.

(3) The near-surface natural clays which are predominantly of CH classification are satisfactory for the construction of embankments and of perimeter dikes for diverting surface runoff. Embankment materials should not contain excessive vegetation, roots and other organic matter. Depending on the natural moisture content of the embankment soils, weather conditions during construction, and soil plasticity characteristics lime treatment may be needed to facilitate compaction.

(4) The location of the ash storage areas should be established to provide at least 4 ft of low permeability natural in-place clay soils beneath the storage area and surrounding embankments. The 4 ft of natural CL-CH soils should provide a suitable liner for the storage areas; therefore, we do not feel that additional earth or artificial liners are needed. Localized deposits of silts that may be present at finished grade should be excavated and replaced by compacted clay. In areas where the impermeable clay is not present in sufficient thickness, we recommend either to remove and replace the more permeable soils

with clay of CH-CL classification or construct an earth liner to obtain an equivalent thickness of impermeable clay soil of at least 4 ft.

Field Investigation

Subsurface conditions at the site were investigated by 31 undisturbed-sample borings spaced in a grid pattern generally 1000 ft apart, as shown on Plate 2. The borings are numbered 177 through 181 and 213 through 238 to be consecutive with previous borings made at W. A. Parish Generating Station for other projects and were drilled to depths ranging from 10 to 60 ft using a truck-mounted rotary drilling rig. Borings 177 through 181 were drilled during a previous investigation using wet rotary procedures, but the remaining holes were made by advancing an auger without the use of water.

Sampling for cohesive soils was performed with a 3-in. thin-walled tube sampler in general accordance with the procedures of ASTM D 1587-74 and for cohesionless soils with a 2-in. split-barrel sampler using the Standard Penetration Test procedure described by ASTM D 1586-67. The samples were removed from the sampler in the field and classified by a soil technician. Representative portions were sealed in containers and transported to our Houston laboratory for testing. Detailed descriptions of the soils encountered in the borings are given on the individual boring logs presented on Plates 3 through 14. A key to most of the symbols and terms appearing on the boring logs is given on Plate 15.

Measurements of the depth to water in the open boreholes were made generally one day after completion of the borings. This information is recorded in the lower right-hand corner of the boring logs along with the date of the measurement.

Laboratory Investigation

The laboratory testing program was designed to measure pertinent engineering properties of the soils encountered in the borings. Tests were performed on selected specimens from Borings 177 through 181 to measure cohesive shear strengths. General classification tests were conducted on various samples to complete the soil descriptions, provide an indication on soil permeability, and to provide correlations which would expand the usefulness of the strength data. The results of most of these soil tests are plotted or tabulated on the individual boring logs on Plates 3 through 14. The following tabulation gives the types and number of tests performed for this study. Also noted are the symbols used to plot the test results on the boring logs or the method of presentation if not plotted.

Type of Test	Number of Tests	Symbol
Unconfined Compression	4	○
Unconsolidated-Undrained Triaxial Compression	4	△
Hand Penetrometer	33	⊗
Torvane	93	✧
Water Content	126	●
Liquid and Plastic Limits	41	+-----+
Percent Passing No. 200 Sieve	8	Tabulated under "-#200,%" on log
Sieve Analyses	3	See Plate 16

Falling head permeability tests were performed on two soil samples; results of these tests are presented on Plates 17 and 18.

General Site Conditions

Geology. The site is located within the geologic flood plain of the Brazos River. In some areas the natural soils encountered near the ground surface are apparently of Recent geologic age which have been deposited during floods as interfluvial clays and silts. Beneath the river valley deposits are clay and sand strata of Pleistocene geologic age which were deposited in a deltaic environment and exposed to many cycles of alternate wetting and drying during a period of low ocean level resulting in the densification of the underlying strata. The flood plain clays have also been desiccated and densified by areal exposure.

The Fort Bend County Soil Survey Report describes two major surficial soil types in this area, the Miller clay and soils of the Sloping Alluvial Land. The Miller clay, CH according to the Unified Classification System, is generally reddish-brown and exhibits a very low permeability. Sloping Alluvial Land soils are found on the banks of streams or sloughs and may be coarse or fine textured deposits.

Topography. The 800-acre tract is relatively level but contains undrained depressions and is dissected by tributaries of Rabbs Bayou. Ground surface varies from El 57 to El 64 ft as shown by elevations at the borehole locations. The northwest portion of the site is densely wooded while the remaining acreage is used for pasture land.

General Soil Conditions. Soil conditions disclosed by the boring data consist principally of stiff to hard brown and gray clay of CH classification to about 30-ft depth. Values of liquid limits and plasticity indices vary from 52 to 109 and from 29 to 73, respectively. Natural water contents are found to be at or above the plastic limit and cohesive shear strength estimates obtained with a Torvane ranged from 600 to 4000 psf.

Boring 179 disclosed alternating strata of silt, silty clay and sand below the upper clay. Layers of silty clay, CL classification, of varying thicknesses and positions are disclosed in Borings 218, 225, 227 through 229, 233 through 235 and 238. Values of liquid limits and plasticity indices range from 27 to 45 and from 7 to 30, respectively. The majority of the liquid limit values of the clay, however, exceed 30 as shown on Plate 18.

Groundwater Level. Measurements of the depth of water in the open augered boreholes indicate the depth to groundwater may vary from El 47 to El 59 ft with an average of El 51 ft. Water level measurements in Borings 177 and 178 indicated the depth to water may be 1 to 2.5 ft below the ground surface near those locations.

Permeability. The permeability tests performed on samples of silty clay indicate the coefficient of permeability may vary from 2.3×10^{-6} to 2.8×10^{-8} cm per sec, depending on clay plasticity characteristics and void ratio. The value of 2.3×10^{-6} cm per sec obtained on a silty clay sample of very low plasticity whose liquid and plastic limits were 29 and 22, respectively, is judged to represent an upper value for soil permeability of the silty clays. Since most of the clay soils found at this site exhibit significantly higher plasticity characteristics, we would expect these CH-CL clays to have a coefficient of permeability of 1.0×10^{-7} cm per sec or lower in either a natural state or when compacted in accordance with recommendations presented in the following paragraphs.

Design and Construction Considerations

Site Selection. We recommend that the ash storage areas be located and constructed so that there will be at least 4 ft of relatively impermeable natural clay, CH or CL classification (liquid limit and plasticity index of at least 30 and 15, respectively), that forms the base of the storage areas and embankments. Silt or clay of very low plasticity (liquid limit and plasticity index less than 30 and 15, respectively) that is present at or within 4 ft of finished grade should be removed and replaced by compacted clay of CH or CL classification that exhibits a liquid limit of at least 30 and plasticity index of 15 or more. Alternatively, an earth liner should be constructed to obtain an equivalent thickness of impermeable clay of at least 4 ft. We do not feel that either natural or artificial liners will be needed for ash storage areas constructed in accordance with the above criteria.

Fill Selection and Placement. Earthwork embankments around the ash storage areas may be constructed from the natural clay soils found on the site. We recommend that the clay fill should have a liquid limit of at least 30 and plasticity index of 15 or more. The surface soils containing excessive vegetation, roots and other organic material probably to a depth of 6 in. should be stripped from beneath the embankments and should not be used for earthwork construction.

Clay fill should be placed in lifts not exceeding about 8-in. loose thickness and compacted to a dry density of about 95 percent of the maximum dry density determined in accordance with ASTM D 698-70. The moisture content of the clay fill during compaction should be at or slightly above the optimum moisture content as determined by the same test procedure.

* * *

The following illustrations are attached and complete this report.

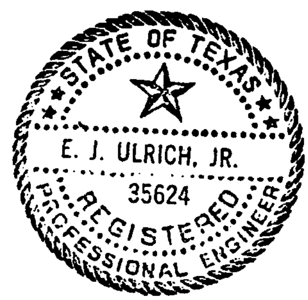
Plate 1	Vicinity Map
Plate 2	Plan of Borings
Plates 3 through 14	Logs of Borings
Plate 15	Key to Terms and Symbols
Plate 16	Grain-size Curves
Plate 17	Results of Permeability Tests
Plate 18	Plasticity Chart

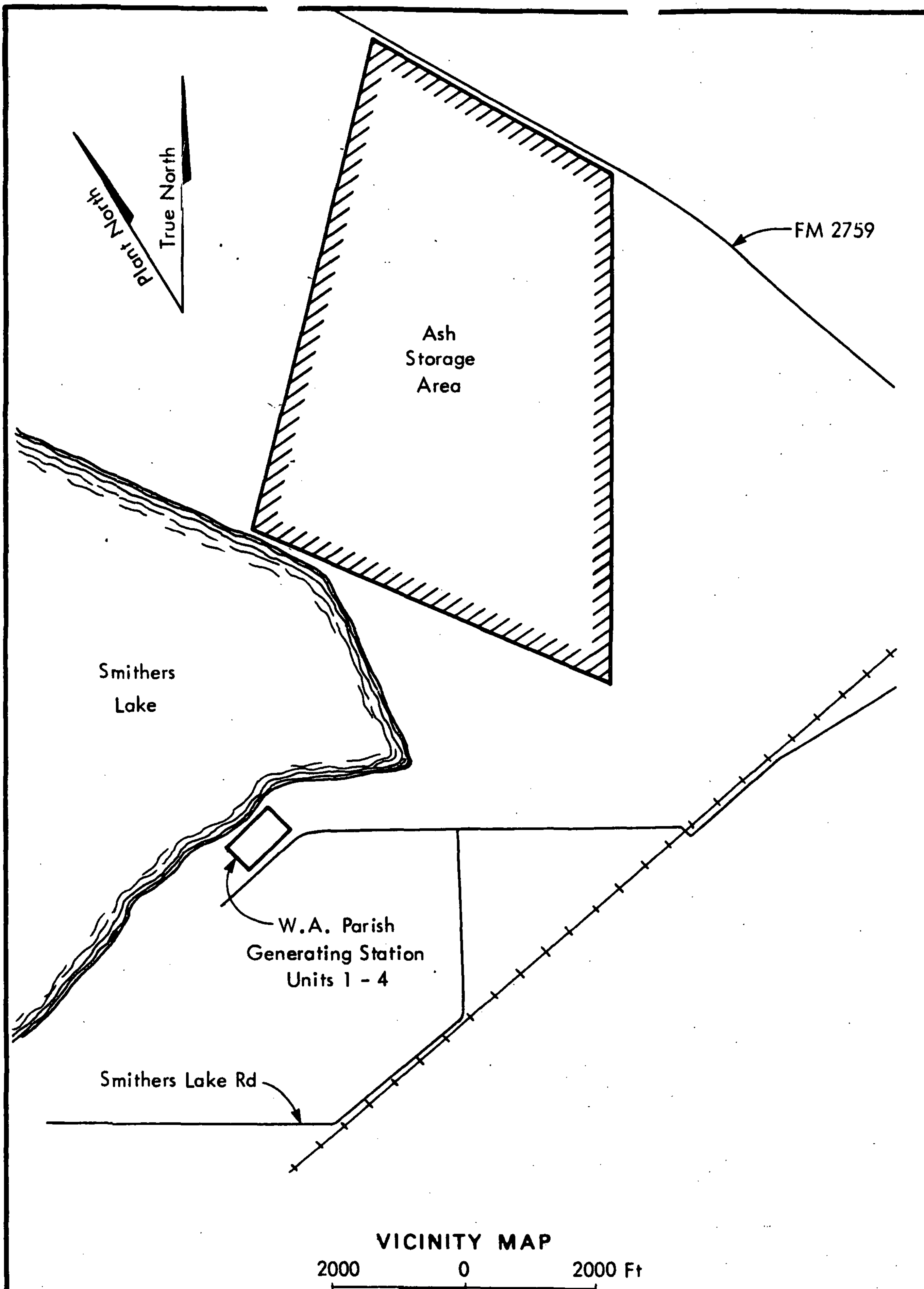
We appreciate the opportunity to assist you on this project. Please call on us when we can be of further assistance.

McCLELLAND ENGINEERS, INC.

Edward J. Ulrich, Jr., P.E.
Project Manager

LSM/EJU/smc
Copies Submitted: (4)





VICINITY MAP

McCLELLAND ENGINEERS

PLATE 1

8

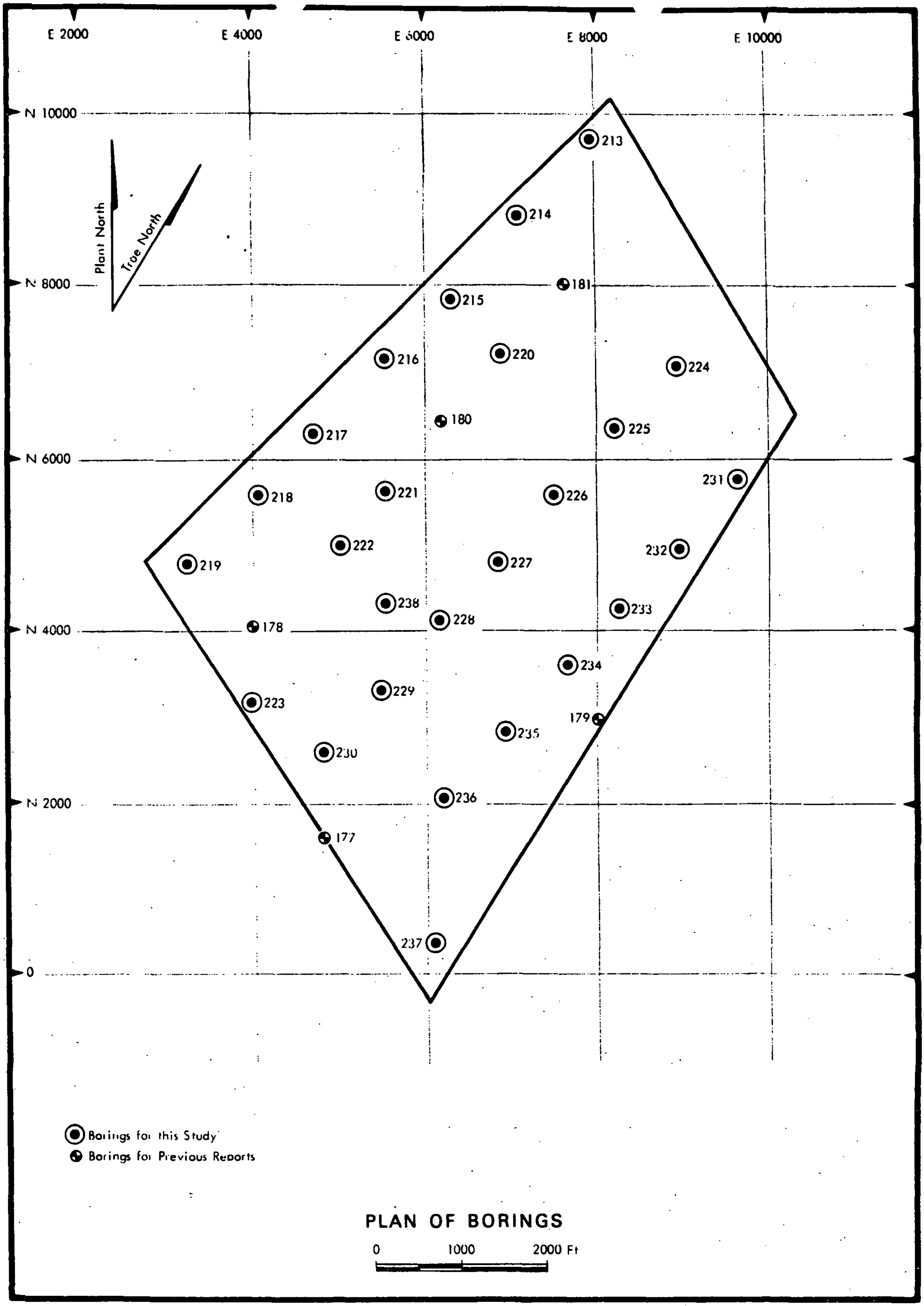


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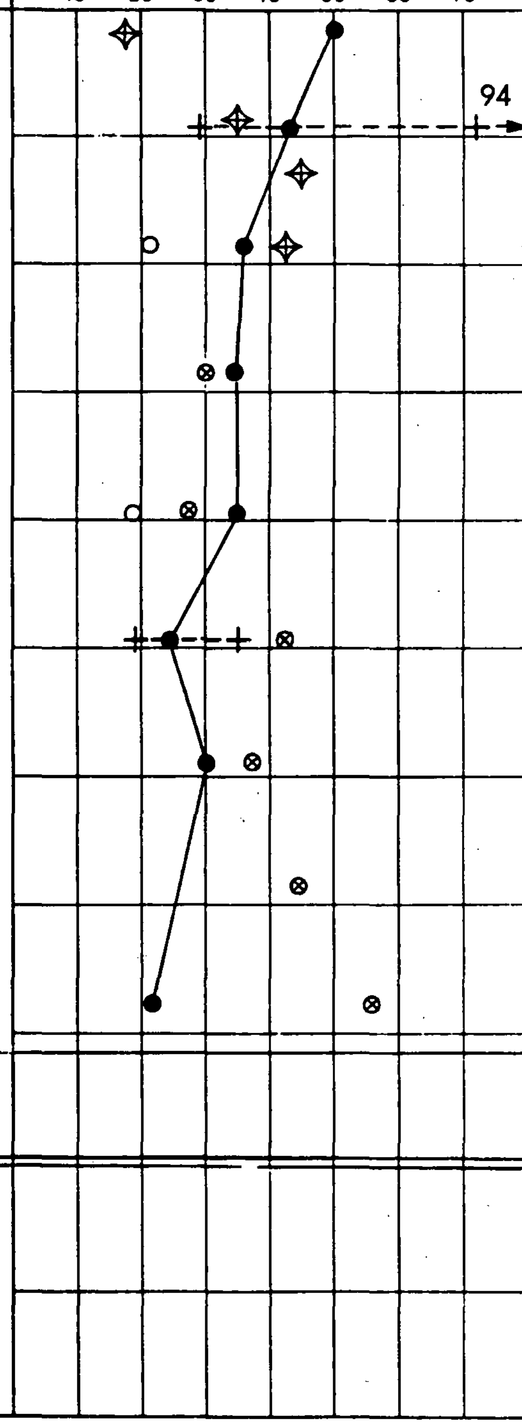
PLATE 2

LOG OF BORING NO. 177
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N 1646.5; E 4869.6

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) — PLASTIC LIMIT / WATER CONTENT, % / LIQUID LIMIT (10 20 30 40 50 60 70)	-#200, %
0–40			Firm dark gray clay (CH)				
			-with organic matter to 2'				
5			-brown, 4.5' to 6'			94	
			-reddish brown, 6' to 13'				
			-with sand pockets, 6' to 22'				
10			-stiff below 6'		86		
15			-reddish brown & gray, 13' to 18'				
			-slickensided, 13' to 22'				
20			-brown & gray, 18' to 22'		86		
25			-with reddish brown silt layers, 22' to 26'				
35			-brown & gray below 33'				
40			-with shell fragments below 38'				
40–50			Tan silt, slightly clayey, with clay seams (ML)	4			
50			Tan fine to medium sand (SP)	26			7



Note Scale Change

COMPLETION DEPTH: 50'
DATE: June 6, 1975

DEPTH TO WATER IN BORING: 0.7'
Caved at: 3.3'
DATE: June 16, 1975

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PLATE 3

10

LOG OF BORING NO. 178

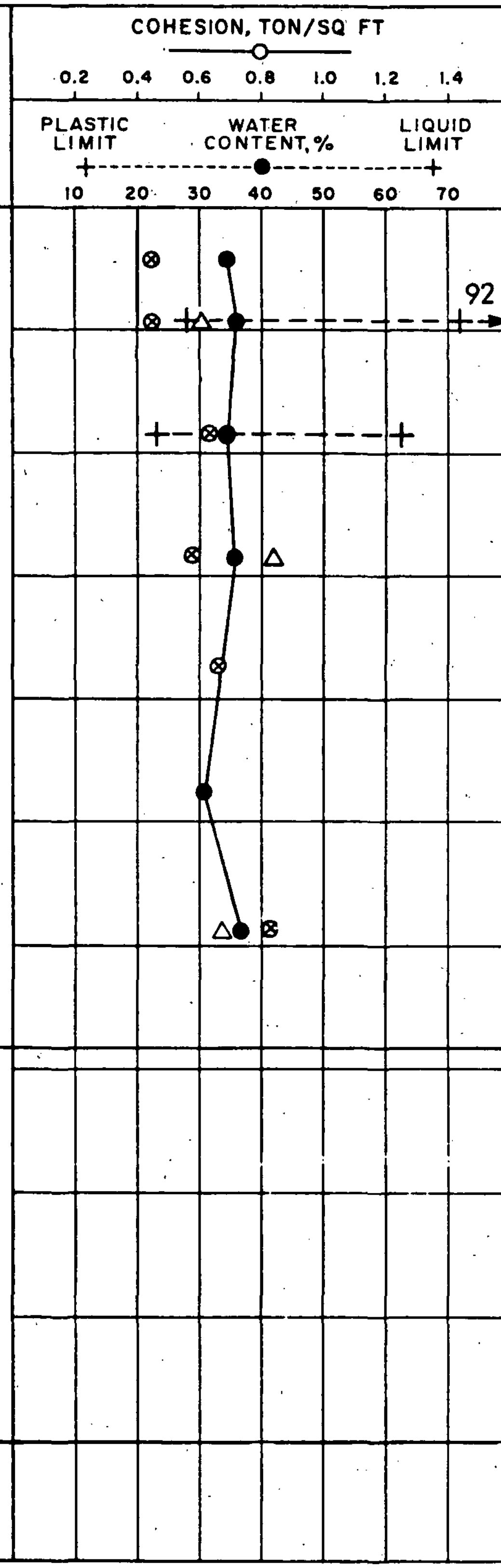
ASH STORAGE AREA

W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N 4136.7; E 4034.6

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	-#200, %
	Firm brown clay (CH)			
	-with organic matter to 2'			
5	-slickensided below 2'		86	
	-with calcareous nodules & mica, 7' to 13'			
10	-stiff below 7'		90	
	-reddish brown with ferrous nodules, 8' to 23'			
15			88	
20	-with calcareous nodules & shell fragments, 18' to 23'			
	-with tan silt layers, 23' to 25'			
25	-brown & gray below 25'			
30			84	
35	Brown & gray silty fine sand (SM)			30
	-tan below 38.5'			
40		20		
		21		
50	-with brown clay pockets & traces of medium sand below 48.5'	50/9"		13
60				

Note Scale Change



COMPLETION DEPTH: 60'
DATE: June 5, 1975

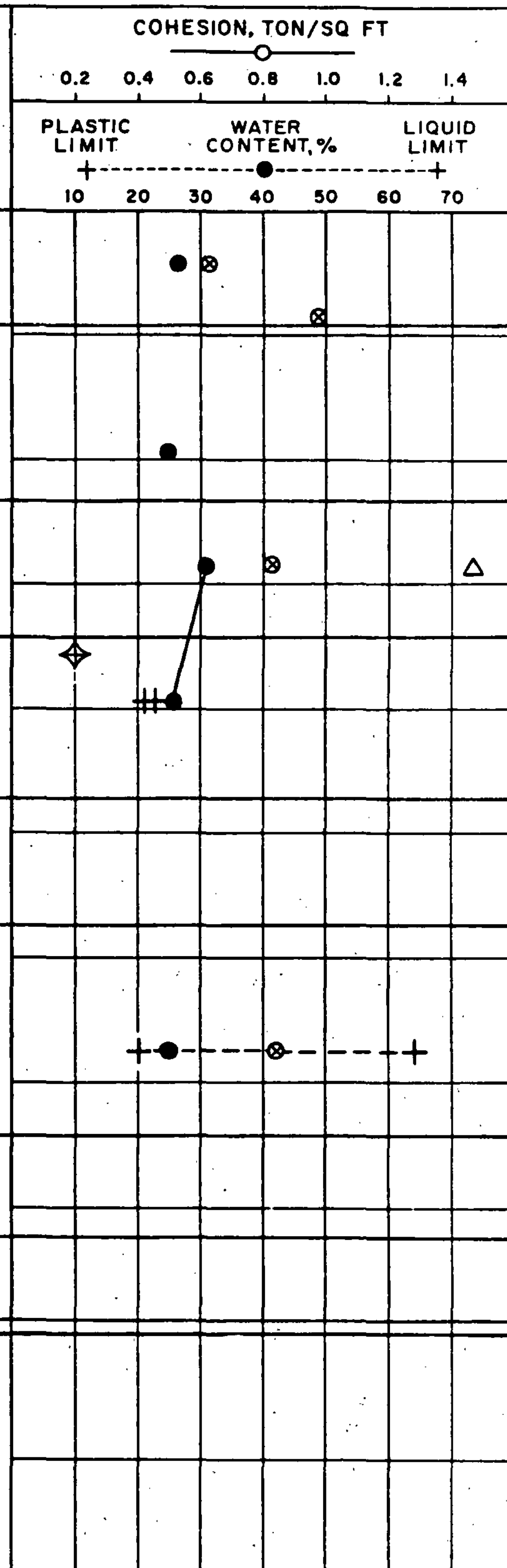
DEPTH TO WATER IN BORING: 2.5' Caved at: 5.2' DATE: June 6, 1975

McCLELLAND ENGINEERS

LOG OF BORING NO. 179
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N3024.7; E8057.1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	-#200,%
0–4.5	Stiff dark gray clay (CH) -with roots to 1.5' -brown with calcareous nodules & sand pockets below 2'			
4.5–11.5	Tan silt (MH) -with roots & ferrous nodules below 5'			87
11.5–17	Stiff reddish brown clay, blocky -with silt layer, 13' to 13.5' (CH)		92	
17–23	Soft dark gray very silty clay (CL) -with tan silt layer, 19.5' to 21' -brown below 21'			
23–28	Tan silt (MH)			
28–37	Stiff reddish brown clay (CH) -brown with gray streaks below 29.5' -with organic matter, 33' to 35'	5		
37–42	Tan silty fine sand (SM)	12		13
42–48	Brown silt with clay seams (MH)	4		
48–50	Tan silty fine sand with clay pockets (SM)	20		14



Note Scale Change

COMPLETION DEPTH: 50'
DATE: June 6, 1975

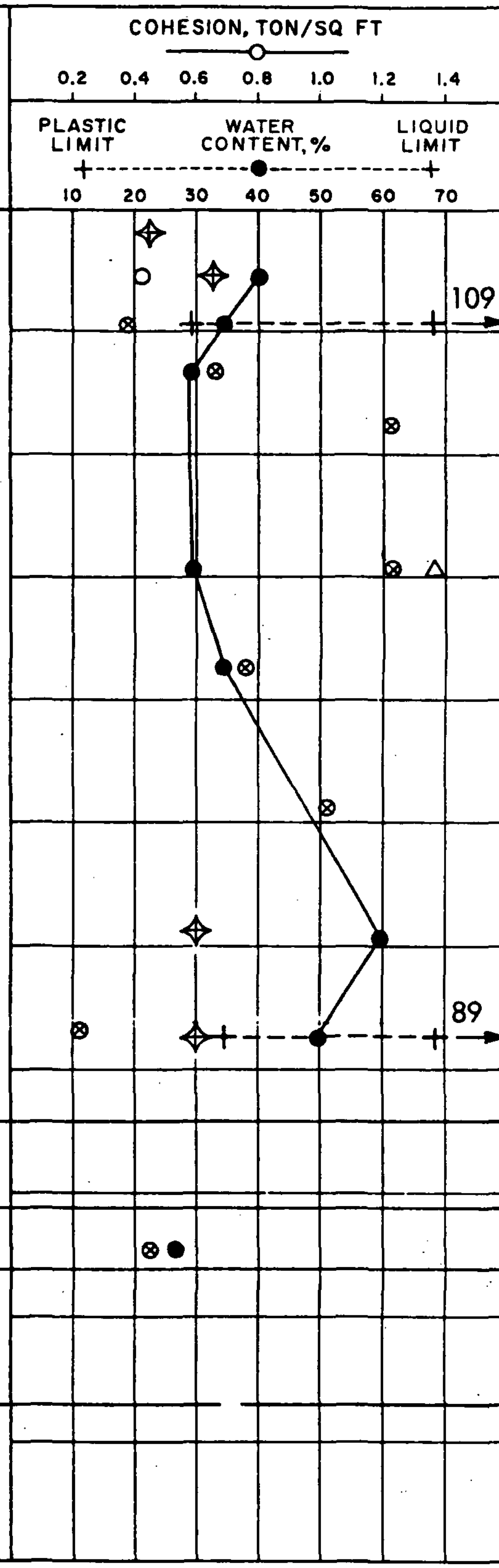
DEPTH TO WATER IN BORING: 9.3' Caved at: 10.5' DATE: June 16, 1975

McCLELLAND ENGINEERS

LOG OF BORING NO. 180
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N 6476.7; E 6243.6

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT / PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT	-#200, %
0–37			Firm brown clay (CH) -with organic matter to 2' -stiff, 2' to 4' -with calcareous nodules, 4' to 29.5' -stiff reddish brown, 5.5' to 8' -very stiff, 8' to 18' -reddish brown & light gray, slickensided, with sand pockets & ferrous stains, 8' to 27' -stiff below 18' -gray, 27' to 29.5' -with sand pockets, organic matter & shell fragments below 33'		80 96	109 89	
37–40			Brown silt with clay seams & (MH) pockets & organic matter				91
40–43			Stiff brown clay (CH) -with silt layer, 43.5' to 44.4'				
44–56.5			Tan fine to medium sand with shell fragments & traces of mica (SP)	15 48			6



Note Scale Change

COMPLETION DEPTH: 56.5'
DATE: June 5, 1975

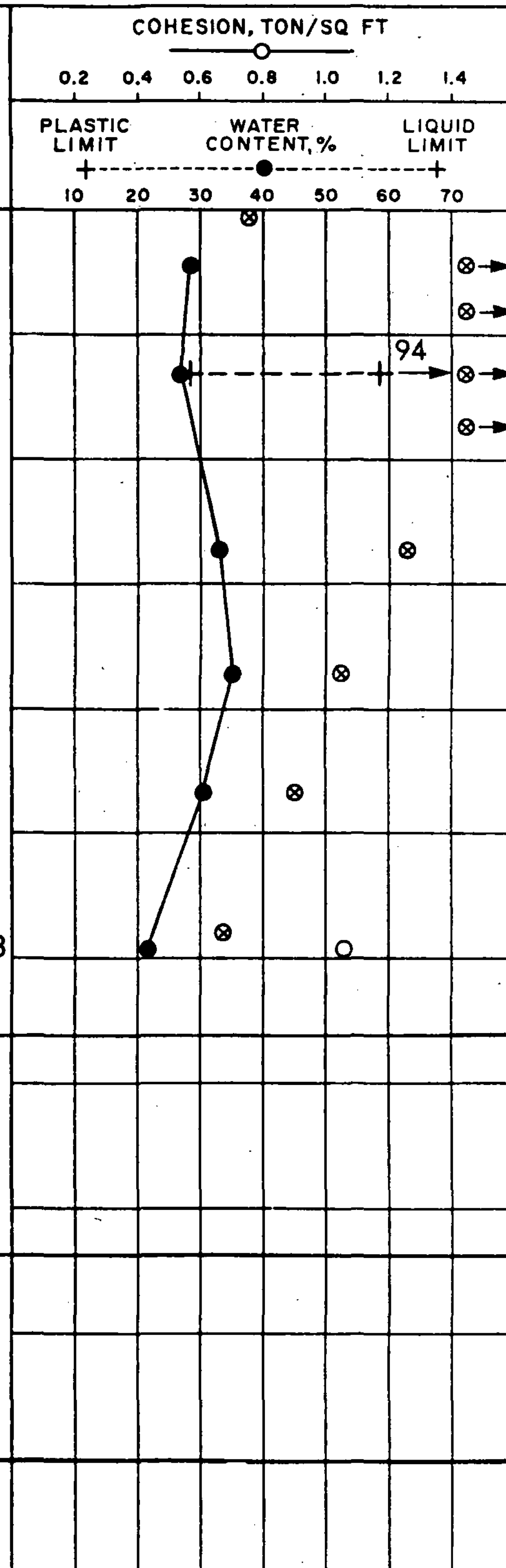
DEPTH TO WATER IN BORING: 11.5' Caved at: 12' DATE: June 6, 1975

McCLELLAND ENGINEERS

LOG OF BORING NO. 181
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N 8093.5; E 7649.2

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	-#200, %
0–33	Stiff brown clay (CH) -with organic matter to 1.5' -with calcareous nodules, 2' to 6.5' -very stiff, blocky, 2' to 23' -reddish brown with ferrous nodules, 6.5' to 13' -reddish brown & light gray and slickensided below 13' -with silt pockets & partings, 23' to 26' -stiff below 23' -gray, slightly sandy, with organic matter, 26' to 32'		103	
33–42	Brown & gray silt (MH) -tan with reddish brown & gray clay pockets below 38'			88 88
42–60	Tan silty fine sand (SM)	13 18		28



Note Scale Change

COMPLETION DEPTH: 60'
DATE: June 6, 1975

DEPTH TO WATER IN BORING: - Caved at: 11.4' DATE: June 12, 1975

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PLATE 7

14

LOG OF BORING NO. 213

ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube
Location: N 9700; E 7919

Surface El : 63.6'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Very stiff brown clay (CH)				
-with organic matter to 3'	1.2			
-with ferrous nodules to 7'		32	90	30
-with calcareous nodules, 2' to 5'	1.2	31		
-tan below 5'	1.1	33		
	1.2	33		

Completion Depth: 9.5'
Date: June 27, 1976
Depth To Water In Boring: Dry Date: June 28, 1976

LOG OF BORING NO. 214

ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube
Location: N 8831; E 7140

Surface El : 63.9'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Stiff brown clay with calcareous nodules (CH)	0.5			
-with organic matter to 3'	1.0	40		
-with ferrous nodules below 3'	1.2	32	84	28
-red & slickensided below 3.5'		33		
-very stiff below 5'	1.2			
		34		

Completion Depth: 9.5'
Date: June 27, 1976
Depth To Water In Boring: Dry Date: June 28, 1976

LOG OF BORING NO. 215

ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube
Location: N 7900; E 6386

Surface El : 63.9'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Very stiff brown clay (CH)				
-with organic matter to 5'	1.2			
-gray, 2' to 3.5'		38	98	30
-with calcareous nodules below 2'				
-brown, 3.5' to 5.5'	1.0	36		
-red with ferrous nodules below 5.5'	1.1	33		
	1.2	33		

Completion Depth: 9.5'
Date: June 27, 1976
Depth To Water In Boring: Dry Date: June 28, 1976

LOG OF BORING NO. 216

ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube
Location: N 7210; E 5583

Surface El : 64.0'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Very stiff brown clay with calcareous & ferrous nodules (CH)	1.6			
-with organic matter to 3'		36	95	31
	1.2	34		
-red below 5.5'	1.0			
		34		
	1.3	31		

Completion Depth: 9.5'
Date: June 26, 1976
Depth To Water In Boring: Dry Date: June 27, 1976

LOG OF BORING NO. 217
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube **Location:** N 6350; E 4788

Surface El : 63.8'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Stiff brown clay with calcareous nodules (CH)				
-with organic matter to 4'	0.7	38	96	27
-with ferrous nodules, 4' to 7.5'				
-red, 4.5' to 13.5'				
-with 2" silt seam at 6.5'	0.8	29		
-very stiff below 7'				
	1.0	35		
-tan & light gray below 13.5'				
-with shell fragments below 18.5'				
	1.2	35		

Completion Depth: 19.5' Depth To Water In Boring: 5'
Date: June 28, 1976 Date: June 29, 1976

LOG OF BORING NO. 218
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube **Location:** N 5750; E 4130

Surface El : 64.1'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Stiff brown clay (CH)				
-with organic matter to 2'	0.8	22	30	20
-silty 2' to 2.5'		38		
-tan & gray below 2.5'				
-with tan silt partings below 3.5'	2.0	17		
-hard below 5'				
Very stiff tan silty clay (CL)				
		24	29	22

Completion Depth: 10' Depth To Water In Boring: Dry
Date: June 26, 1976 Date: June 27, 1976

LOG OF BORING NO. 219
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube **Location:** N 4830; E 3307

Surface El :

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Stiff brown clay (CH)				
-with organic matter to 4.5'				
-with calcareous nodules below 2'	0.8	35		
-gray & tan, 2.5' to 5.5'	0.8	38	91	31
-very stiff below 6'				
-with ferrous nodules, 8' to 14.5'	0.9	28		
	1.2	34		
-tan & gray, slickensided below 18.5'	1.2	33		

Completion Depth: 20' Depth To Water In Boring: 16.5'
Date: June 28, 1976 Date: June 29, 1976

LOG OF BORING NO. 220
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube **Location:** N 7260; E 6985

Surface El : 63.4'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Stiff brown clay with calcareous & ferrous nodules (CH)	1.0	35	102	32
-with organic matter to 3.5'				
-very stiff below 2.5'	1.8	15		
-red & gray below 4'				
-slickensided with silt partings, 6' to 7'	1.9	31		
	1.6	31		

Completion Depth: 9.5' Depth To Water In Boring: Dry
Date: June 27, 1976 Date: June 28, 1976

LOG OF BORING NO. 221

ASH STORAGE AREA

W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube — **Location:** N 5700; E 5584

Surface El : 63.8'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Very stiff brown clay. (CH)				
-with organic matter to 4.5'	1.5	29	99	25
-with calcareous nodules to 6'				
-with ferrous nodules, 2' to 6'	1.0	34		
-tan, 2.5' to 6'				
-red below 6'	1.3	29		
	1.9	32		

Completion Depth: 9' — **Date:** June 26, 1976

Depth To Water In Boring: Dry — Date: June 27, 1976

LOG OF BORING NO. 222

ASH STORAGE AREA

W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube — **Location:** N 5072; E 5075

Surface El : 57.1'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Very stiff gray clay (CH)	2.3	52		
-with organic matter to 5'				
-gray & tan, 2' to 5'	0.6	42	98	33
	1.7	36		
	1.0	32		

Completion Depth: 9.5' — **Date:** June 27, 1976

Depth To Water In Boring: 9' — Date: June 28, 1976

LOG OF BORING NO. 223

ASH STORAGE AREA

W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube — **Location:** N 3260; E 4054

Surface El : 61.2'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Firm brown clay with calcareous & ferrous nodules (CH)	0.8	32	89	31
-with organic matter to 3.5'				
-very stiff below 2.5'	1.9	28		
-red & gray below 4'				
-slickensided with silt partings,	1.6	27		
6' to 7'	1.6	26		

Completion Depth: 9' — **Date:** June 27, 1976

Depth To Water In Boring: Dry — Date: June 28, 1976

LOG OF BORING NO. 224

ASH STORAGE AREA

W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube — **Location:** N 7120; E 9010

Surface El : 62.6'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Very stiff brown clay with calcareous	1.5	32		
nodules (CH)	1.1	35	88	31
-with organic matter to 3.5'				
-brown & tan, 4' to 5.5'	1.6	30		
-with ferrous nodules below 4.5'				
-tan below 5.5'				
-with silt seam at 7.5'				
-hard below 7.5'	2.5+	20		

Completion Depth: 9.5' — **Date:** June 28, 1976

Depth To Water In Boring: Dry — Date: June 29, 1976

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LOG OF BORING NO. 225
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube
Location: N 6360; E 8369

Surface El: 64.1'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Hard dark gray clay (CH)				
-with organic matter to 3'	2.5+	20	61	20
-red with ferrous nodules & silt partings below 2'	2.5+	14		
Hard red silty clay (CL)	2.5+	10	33	18

Completion Depth: 8.5'
Date: June 28, 1976
Depth To Water In Boring: Dry Date: June 29, 1976

LOG OF BORING NO. 226
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube
Location: N 5630; E 7557

Surface El: 62.1'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Stiff gray clay (CH)	0.7	39	90	35
-with organic matter to 3'				
-with calcareous nodules below 2'				
-very stiff below 3'				
-tan & dark gray, 4.5' to 7.5'	1.2	31		
-red below 7.5'				
-with ferrous nodules below 8'	1.0	30		

Completion Depth: 9.5'
Date: June 28, 1976
Depth To Water In Boring: Dry Date: June 29, 1976

LOG OF BORING NO. 227
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube
Location: N 4835; E 6900

Surface El: 59.3'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Hard brown clay (CH)				
-with organic matter to 3.5'	2.2	33	99	27
-with calcareous nodules below 2.5'				
-very stiff below 5'	2.0	33		
-with ferrous nodules, 6' to 8'	1.8	31		
-with tan silt partings below 9.5'	1.6	26		
	1.5	34		
Stiff to firm tan & brown silty clay (CL)				
-with clay seams below 18'	0.3	29	39	17

Completion Depth: 19.5'
Date: June 28, 1976
Depth To Water In Boring: 10.1' Date: June 29, 1976

LOG OF BORING NO. 228
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube
Location: N 4125; E 6231

Surface El: 64.2'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Hard dark gray clay with organic matter (CH)	2.2	30		
Stiff tan & dark gray silty clay with siltstone nodules & dark gray clay pockets (CL)		34	45	17
-red below 6'				
		24	27	15

Completion Depth: 10'
Date: June 26, 1976
Depth To Water In Boring: 8.6' Date: June 27, 1976

LOG OF BORING NO. 229
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube — Location: N 3380; E 5531

Surface El : 61.9'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
0–16	Hard brown clay with calcareous nodules (CH)	2.0	28	93	28
	-with organic matter to 2.5'				
	-brown & dark gray, 2' to 4'				
	-slickensided below 2.5'	1.8	28		
	-with ferrous nodules below 4'				
	-tan, 4' to 12'				
	-very stiff below 5'	1.1	31		
	-red & light gray below 12'				
16–20	Stiff gray & tan silty clay with tan silt seams (CL)	0.8	21	34	15

Completion Depth: 20' — Date: June 26, 1976

Depth To Water In Boring: 10.9' — Date: June 27, 1976

LOG OF BORING NO. 230
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube — Location: N 2669; E 4860

Surface El : 61.6'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
0–9	Very stiff brown clay (CH)				
	-with organic matter to 3'				
	-with calcareous nodules below 2.5'	1.0	39	97	28
	-red with ferrous nodules below 4'				
		1.6	32		
		1.3	34		

Completion Depth: 9' — Date: June 26, 1976

Depth To Water In Boring: 9.5' — Date: June 27, 1976

LOG OF BORING NO. 231
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube — Location: N 5820; E 9694

Surface El : 63.0'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
0–9	Hard brown clay (CH)				
	-with organic matter to 5'	2.5+	30		
	-with tan silty fine sand pockets at 2.5'	2.5+	22	52	23
	-red & dark gray below 4.5'				
	-with sand pockets, 4.5' to 5'	2.4	20		
	-with silt partings below 6.5'	1.7	24		

Completion Depth: 9' — Date: June 26, 1976

Depth To Water In Boring: Dry — Date: June 27, 1976

LOG OF BORING NO. 232
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube — Location: N 5020; E 8990

Surface El : 58.6'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
0–19.5	Hard brown & dark gray clay (CH)				
	-with organic matter to 3'				
	-with calcareous nodules below 0.5'	2.5+	25	90	29
	-with tan silt partings & pockets, 3.5' to 14'	2.5+	23		
	-tan & gray, slickensided below 6'				
		1.9	23		
		1.7	30		

Completion Depth: 19.5' — Date: June 26, 1976

Depth To Water In Boring: Dry — Date: June 27, 1976

LOG OF BORING NO. 233
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger, 3" thin-walled tube   Location: N 4290; E 8325

Surface El: 62.7'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Hard dark gray & brown clay with organic matter -tan silt partings below 2.5' (CH)	2.3	20		
Hard red silty clay with silt seams (CL)	2.5+	13	34	16
Hard brown clay with calcareous nodules (CH)	2.0	20		
Firm red & brown silty clay (CL)	0.2	22		

Completion Depth: 10'   Depth To Water
Date: June 25, 1976   In Boring: Dry   Date: June 26, 1976

LOG OF BORING NO. 234
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger, 3" thin-walled tube   Location: N 3687; E 7725

Surface El: 61.6'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Very stiff brown, tan & dark gray clay with ferrous (CH) -with organic matter to 3'	1.2	34	96	28
-gray, 2' to 4.5' -with calcareous nodules below 2'	1.6	30		
-tan & gray 4.5' to 7.5' -red below 7.5' -silty, 7.5' to 9.5' & 12' to 13.5' -with silt seams, 9.5' to 12'		26		
		26		
-with red silt partings below 18'	1.5	28		

Completion Depth: 20'   Depth To Water
Date: June 25, 1976   In Boring: 12.3'   Date: June 26, 1976

LOG OF BORING NO. 235
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger, 3" thin-walled tube   Location: N 2897; E 7010

Surface El: 61.4'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Hard tan clay (CH)	2.4	39	98	29
-with organic matter to 3'	0.7	24		
Stiff red silty clay (CL)	0.5	21	33	22
	0.5	24		

Completion Depth: 10'   Depth To Water
Date: June 25, 1976   In Boring: 9.7'   Date: June 26, 1976

LOG OF BORING NO. 236
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger, 3" thin-walled tube   Location: N 2128; E 6290

Surface El: 61.7'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Hard brown clay with calcareous nodules (CH)	2.0	33		
-with organic matter to 3' -with ferrous nodules to 4.5'	1.2	31	88	30
-red below 2.5' -with tan silt seams & siltstone nodules below 6.5'				
-stiff below 9.5'	0.8	27		

Completion Depth: 10'   Depth To Water
Date: June 25, 1976   In Boring: 9.4'   Date: June 26, 1976

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LOG OF BORING NO. 237
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube Location: N 450; E 6160

Surface El: 57.3'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
0	Very stiff dark gray clay (CH) -with organic matter to 6.5'		43		
	-dark gray & tan, 2' to 6.5'	1.3	40	104	36
	-with calcareous nodules below 4.5'				
	-tan & light gray below 6.5'	1.5	32		

Completion Depth: 9.5' Depth To Water In Boring: 8.4'
Date: June 25, 1976 Date: June 26, 1976

LOG OF BORING NO. 238
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube Location: N 4480; E 5510 (Approx.)

Surface El: 64.1'

Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
Very stiff brown clay with organic matter (CH)				
Very stiff red silty clay with silt seams & calcareous nodules (CL)	1.1	19	39	17
	1.1	20		
Very stiff red clay with calcareous nodules (CH)	1.8	24		
	1.2	30		

Completion Depth: 9' Depth To Water In Boring: Dry
Date: June 27, 1976 Date: June 28, 1976

LOG OF BORING NO.

Type: Location:

Depth, Feet | Symbol | Samples | Surface El:

Completion Depth:
Date:

LOG OF BORING NO.

Type: Location:

Depth, Feet | Symbol | Samples | Surface El:

Completion Depth:
Date:

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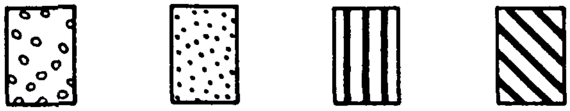
SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES
(SHOWN IN SYMBOL COLUMN)



Gravel Sand Silt Clay
Predominant type shown heavy

SAMPLER TYPES
(SHOWN IN SAMPLES COLUMN)

Shelby Tube Auger Split Spoon No Recovery

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM	RELATIVE DENSITY
Loose	0 to 40%
Medium dense	40 to 70%
Dense	70 to 100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH TON/SQ FT
Very soft	less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very stiff	2.00 to 4.00
Hard	4.00 and higher

Note: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided – having inclined planes of weakness that are slick and glossy in appearance.

Fissured – containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

Laminated – composed of thin layers of varying color and texture.

Interbedded – composed of alternate layers of different soil types.

Calcareous – containing appreciable quantities of calcium carbonate.

Well graded – having wide range in grain sizes and substantial amounts of all intermediate particle sizes.

Poorly graded – predominantly of one grain size, or having a range of sizes with some intermediate size missing.

Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No. 3-357, Waterways Experiment Station, March 1953.

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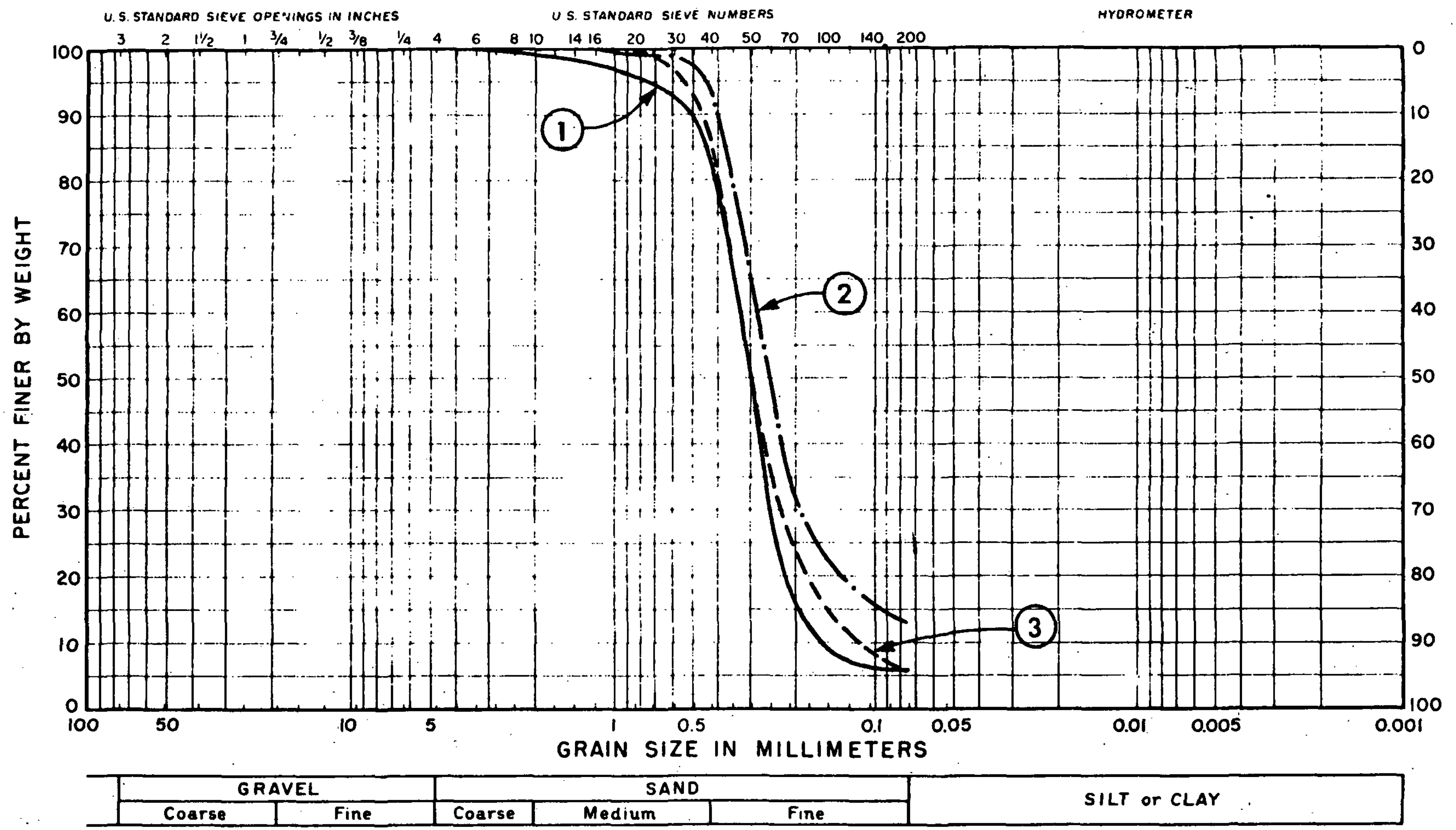
GRAIN SIZE CURVES



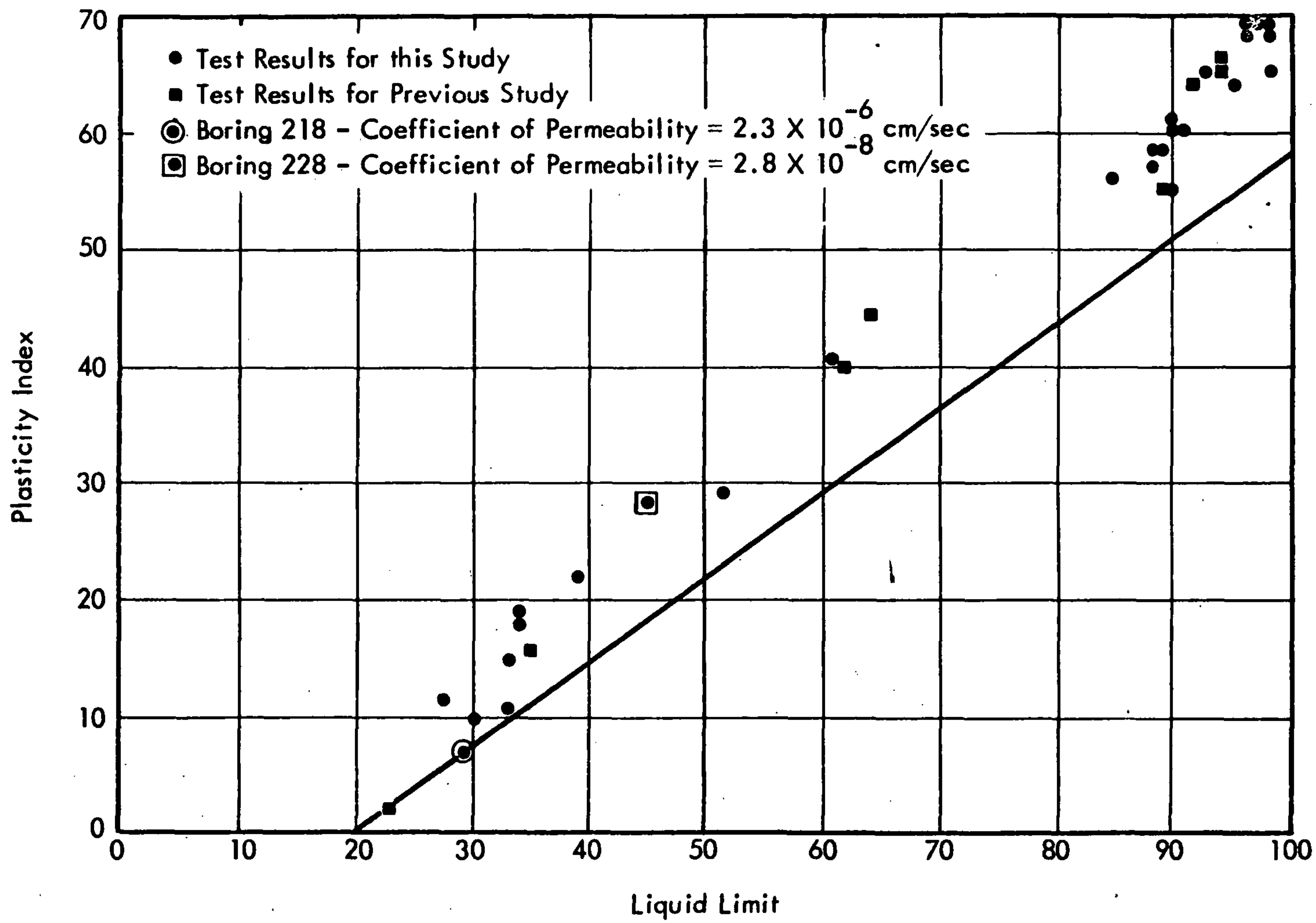
Curve No.	Boring No.	Depth, Ft.	Material
1	177	50	Tan fine to medium sand
2	179	50	Tan silty fine sand
3	180	50	Tan fine to medium sand

PLATE 16

23

Boring	Depth, Ft.	Material	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Permeability cm/sec
218	10	Silty Clay	102	24	29	22	2.3×10^{-6}
228	2.5	Silty Clay	95	34	45	17	2.8×10^{-8}

RESULTS OF PERMEABILITY TESTS



PLASTICITY CHART

Reference 13

15W31631

The Light company Houston Lighting & Power P.O. Box 1700 Houston, Texas 77001 (713) 228-9211

5/20/85

May 13, 1985

Jay Snow, P. E., Chief
Solid Waste Section
Texas Department of Water Resources
P.O.Box 13087 Capitol Station
Austin, Texas 78711

SUBJECT: W. A. PARISH GENERATION STATION, TDWR NO. 31631
EXPANSION OF COAL COMBUSTION BY-PRODUCT STORAGE AREA

Dear Mr. Snow:

This letter is in response to alledged deficiencies and recommendations discussed in your letter of December 27, 1984. This letter contained the results of your staff review of the engineering plans for an additional 30-acre coal combustion by-product storage area located at Houston Lighting & Power Company's W. A. Parish Generating Station. These engineering plans, as well as notice of expansion as required by 31 TAC, Section 335.6, were provided by my letter of October 26, 1984.

Your December 27, 1984 letter raised issues in two areas, as discussed below.

1. Groundwater Protection - your letter pointed out that groundwater monitoring was not proposed as recommended in Texas Department of Water Resources (TDWR) Technical Guideline No. 3. Installation of a groundwater monitoring system and development of a groundwater monitoring program outlining monitoring parameters and frequency of analysis was recommended.

   Groundwater monitoring for these Class II wastes is not required by either Environmental Protection Agency or Texas Department of Water Resources regulations. Therefore, the decision as to need for groundwater monitoring falls to the application of good engineering judgement. The August 1, 1984 McClelland Engineers, Inc. geotechnical report submitted with the October 26, 1984 Houston Lighting & Power package contains the following principal findings:

- The soil borings disclosed relatively uniform soil conditions throughout the site that consist primarily of highly plastic clays of CH classification to about 35-ft depth underlain by silty fine sand (SM) to the maximum depth explored, 40 ft. Layers of silty clay (CL) and silt (MH-ML) of varying depths and thicknesses are found in some borings below 3-ft depth.

- Laboratory permeability tests were performed on two samples of near surface clay to obtain an estimate of the permeability of the near surface clay soils. The test results indicate the coefficients of permeability for upper clays are well below 1 X 10^{-7} cm/sec. Previous experience with soils having properties similar to the near surface CH-CL soils which dominate the site indicates these materials should have a coefficient of permeability of 1 X 10^{-7} cm/sec or lower in their natural state.

- The location of the storage area should be established to provide at least 4 ft of low permeability natural in-place clay beneath the storage area and surrounding embankments. The 4 ft of natural clays should provide a suitable liner for the storage area.

In response to the above finding, Houston Lighting & Power Company has located the proposed storage area away from the shallow silt deposits. In light of the relatively uniform, 35-deep layer of highly plastic clays of CH classification, the upper clay permeabilities of well below 1 X 10^{-7} cm/sec (in fact, in the range of 2.3 X 10^{-9} cm/sec), and the engineered location of the storage area, this specific site offers protection to groundwater at a level orders of magnitudes greater than that provide by an artifically lined facility located in a less favorable geologic condition as allowed by TDWR Technical Guideline No. 3. In light of these facts, it has not been the opinion of Houston Lighting & Power Company that groundwater monitoring is needed.

In order to provide another professional opinion on the need for groundwater monitoring, Houston Lighting & Power Company has retained the services of Resource Engineering, Inc., a consulting engineering firm familiar with both the local hydrogeology and solid waste management practices.

The results of their study will be discussed with your staff when completed.

2. Surface Water Protection - your letter correctly states that the the proposed dike constructed of compacted fly ash with a three-foot layer of compacted clay soil placed on the exterior slope does not conform to the dike configuration suggested in TDWR Technical Guideline No. 3. Although not stated in your letter, follow-up meetings between yourself and Houston Lighting & Power Company staff members have established your concern for potential impacts to surface water quality resulting from erosion of the exterior compacted clay soil cover and exposure of the coal combustion by-products.

   In order to provide an increased level of erosion protection, Houston Lighting & Power Company will increase the levee exterior slope compacted clay soil cover thickness. Details of the increased compacted clay soil cover are shown on Houston Lighting & Power Company drawing HEP-9489, Sheet 2, Revision No. 2, attached. Note that this will result in the entire twelve foot crest width being constructed of compacted clay soil in the proposed levee standard sections. This, in fact, exceeds the suggested crest width of eight feet contained in the TDWR Technical Guideline No. 3. Further note that the portion of the levee which will be subject to the greatest erosion potential will have approximately five feet of compacted clay. Additionally, a road wearing surface will be placed on the levee crest along the entire levee circumference. This road wearing surface, which is a feature over and above the suggestions contained in the TDWR Technical Guideline No. 3, will provide an addition degree of erosion protection.

The W. A. Parish Generating Station provides over 3,000 megawatts of electric power capacity and over 25% of the electric power use to the over three million users in the greater Houston area. The proposed coal combustion by-product storage area is required to support continued operation of the W. A. Parish Generating Station. Due to the extremely urgent need to support continued plant operation, Houston Lighting & Power Company initiated construction of this facility on May 13, 1985.

It is the policy of Houston Lighting & Power Company to comply with all environmental laws and regulations. Houston Lighting & Power Company believes the proposed actions described in our letter of October 26, 1984 and this correspondence satisfy the rules and regulations of the Texas Department of Water

Resources. Finally, I wish to extend our thanks for your help and cooperation during the numerous meetings and telephone discussions held with Houston Lighting & Power Company staff members to finalize the plans for this facility.

Very truly yours,

W. F. McGuire, Manager
Environmental Protection Department

EAF/pm/L7

Reference 14

ISW 31631

HYDROGEOLOGIC EVALUATION

AT THE

W.A. PARISH GENERATING STATION

FOR

HOUSTON LIGHTING & POWER COMPANY
HOUSTON, TEXAS

DECEMBER 1985

344-02

REI

RESOURCE ENGINEERING

3000 RICHMOND AVENUE, HOUSTON, TEXAS 77098, (713) 520-9900

Table of Contents

List of Attachments

1.0 INTRODUCTION

During the summer of 1985, REI performed a detailed hydrogeologic investigation of the coal combustion by-product storage area at Houston Lighting & Power (HL&P) Company's W.A. Parish Electric Generating Station. The purpose of the investigation was to assess the need for groundwater monitoring in the vicinity of the storage area.

There are three areas designated for coal combustion by-product storage as shown in Figure 1 of Attachment 1. Two of these are active above-ground landfills, and the third is a proposed 30-acre site for an above-ground landfill. All three areas are designed for storage of coal combustion by-products (fly ash, bottom ash and FGD sludge) generated at the Parish Station. All coal combustion by-products have been designated as Class II wastes by the Texas Water Commission.

In order to evaluate the hydrogeology of the area, it was necessary to first define the subsurface stratigraphy. This information, along with the knowledge of the regional geology and hydrogeology, provides for an interpretation of the potential for groundwater contamination and the need for groundwater monitoring.

2.0 REGIONAL GEOLOGY

The HL&P Parish Station is located on the western Gulf Coastal Plain Geologic Region which consists of thousands of feet of sedimentary materials deposited by formerly and presently active deltaic, alluvial, eolian dune, bay-estuarine and barrier island-shoreline geologic processes. The Gulf Coastal Plain is underlain by a thick series of sedimentary deposits (in excess of 30,000 feet) which crop out in belts parallel to the Coast and dip at low angles thickening down-dip toward the Gulf. The lithology of these sequences reflect three depositional environments: continental (alluvial plain), transitional (delta, lagoon, and beach), and marine (continental shelf).

The deposits of the Gulf Coastal Plain belong chiefly to the Tertiary Period (70 million to 3 million years old) and to the Pleistocene epoch and Holocene epoch, 3 million to 0.2 million years and 0.2 million years old to present, respectively.

The upper Tertiary (Pliocene) and Quaternary (Pleistocene and Holocene) stratigraphic units are, from the oldest to youngest, the Goliad Formation of Pliocene age, the Willis Formation of Pleistocene age, the Montgomery and Bentley of Pleistocene age, the Beaumont Formation of Pleistocene age, and Pleistocene to Recent alluvial and Coastal deposits.

The Goliad Formation lies unconformally over clays of the Fleming Formation and is, in turn, overlain by deposits of the Willis Formation. The Goliad crops out in a belt 10 to 20 miles wide that trends roughly northeast and parallel to the coast. The Goliad sediments are generally light-gray, medium to coarse grained unconsolidated sands, locally cemented, and cross-bedded. These sands are interbedded with pinkish or greenish calcareous clay, marls, and clayey sands. A cherty conglomerate is common at the base of the formation.

The Willis Formation overlies the Goliad and consists predominately of sands. The Montgomery and Bentley overlie the Willis and are undifferentiated sediments consisting of clay with some sand layers.

The Beaumont Formation of Pleistocene age, which crops out over most of Harris County, overlies the Montgomery and Bentley. The Beaumont Formation crops out as a low plain 30 to 40 miles wide and parallel to the coastline and dips southeast toward the Gulf at a rate of 1.5 to 5 feet per mile. The Beaumont Formation is principally a poorly bedded, calcareous clay of various colors, containing thin discontinuous stringers and lenses of silt, sand, and fine sand. These materials were deposited in deltaic and fluvial environments and distributary channels; interdistributary lakes, bays, and lagoons; and river channel and overbank deposits.

The Geologic Atlas of Texas, Houston Sheet, 1968 (Attachment 2) describes the surface deposits in the vicinity of the Parish Station as belonging to the Recent Alluvium of the Brazos River and the Beaumont Formation of Pleistocene age. The deposits are described as being mostly point bar, natural levee, stream channel and backswamp deposits.

Typical environments of deposition for the sand bodies encountered at the Parish Station are shown in Figure 2 of Attachment 1. These include the meander belt system in which sandy point bars were deposited in shifting meandering loops. Such deposition resulted in a sinuous, stacked geometry of sand bodies encompassed by overbank deposits of mud, organic material and crevasse splay deposits. Crevasse splay deposits result when the level of the water in the channel is higher than the level outside the channel, thin sheets of water then flow down the sides of the levees. The levee sediment is easily eroded, however, so that sheet flows tend to be concentrated into channels and thus erode gaps through the levees. Such gaps have been named crevasses. As such the stratigraphy is complex with sinuous sand stringers as well as thin, laterally extensive sheet sand deposits.

3.0 REGIONAL HYDROLOGY

Groundwater in the Coastal Plain region occurs under both confined and unconfined conditions. Shallow aquifers in alluvial valleys are important sources of groundwater for limited rural domestic and livestock watering purposes. Wells in these aquifers are generally less than 50 feet deep, and typically yield a few gallons per minute. Recharge of the unconfined aquifers is mainly from local infiltration of rainfall, runoff, and ponded water. Deeper confined aquifers are the source of large volume municipal and industrial groundwater supplies in the area. These include the Chicot, Evangeline, and Jasper aquifers.

The Chicot aquifer system includes the uppermost confined aquifers in the area and generally refers to all Pleistocene or Quaternary deposits, including the unconfined alluvial aquifers, the confining Beaumont clay and underlying Montgomery Formation, Bentley Formation and Willis sand. The thickness of the aquifer increases toward the Gulf from zero at the western edge of the Quaternary outcrop (80 miles from the Gulf) to over 1,200 feet at the Gulf. The transmissivity ranges from zero to about 20,000 feet^2/day, with storage coefficients ranging from 0.004 in the confined area of the aquifer to 0.20 in the northern, unconfined area.

The Evangeline aquifer, comprised of Pleistocene deposits, immediately underlies the Chicot. It is the most important source of fresh groundwater in the Houston metropolitan area. Although it has a lower hydraulic conductivity than the Chicot, the thicknesses are greater, up to about 2,000 feet near the Gulf of Mexico. The transmissivity is greater than that of the Chicot aquifer over much of the area, ranging over 5,000 feet^2/day at the Gulf. The storage coefficient ranges from 0.0005 in the southern confined area to 0.20 in the northern unconfined area. Also, both of the major aquifers nearest the ground surface indicate regional gradients to the southeast, with water in the aquifers flowing down dip between confining layers.

The Evangeline aquifer is underlain by the Burkeville confining layer of the Tertiary Fleming Formation. Below the Burkeville is the Jasper aquifer.

Rainfall is the source of the abundant supply of groundwater in the region. U.S. Weather Bureau records extending back to 1889 show that the extremes in annual precipitation range from more than 70 inches in 1900 to 23 inches in 1917. The average annual precipitation is about 45 inches. Approximately 10 inches of this precipitation runs off in surface streams. Evaporation and transpiration by plants account for most of the remainder. A small portion percolates down through the soil and past the root zone, eventually to reach the water table.

4.0 STRATIGRAPHIC INVESTIGATION

4.1 Field Techniques - There were three areas of investigation: the large existing storage area, the proposed storage area, and a smaller existing storage area located approximately 1100 feet north of the proposed new storage area. The near surface (upper 40 feet) geologic materials were mapped using a geophysical tool called a cone penetrometer. Cone penetrometer soundings were located at 25 locations across the area as shown on the map in Figure 1 of Attachment 1. The grid pattern for the cone locations was based on the data collected in the field as each sounding was made, thus, the distance between each cone location could be adjusted to yield the maximum amount of information per number of soundings.

The cone penetrometer measures mechanical properties of the soil as the cone is forced into the earth. The readings from the cone are recorded on a strip chart log similar to an electric log. Although the properties measured are different, the cone penetrometer log can be interpreted using the same techniques employed in analyzing electric logs.

To confirm the reliability of the cone penetrometer, a hollow stem auger was used to advance a correlation soil boring next to cone sounding location number 7. The boring was sampled continuously and logged by a REI hydrogeologist. The soil samples were used to verify the cone penetrometer interpretation. The cone logs and boring log are included as Attachment 3.

Upon completion of the cone penetrometer work, all but two holes were grouted to the surface with cement. Penetrometer hole numbers 10 and 15 were not grouted due to the hole being covered over when the cone penetrometer truck had to be towed from the location after becoming stuck in the mud. All the sounding locations were surveyed to a local benchmark by an HL&P survey crew.

4.2 <u>Data Analysis</u> - The data generated from the cone penetrometer survey was used to develop six stratigraphic cross sections (Figures 3 through 7 in Attachment 1), which characterize the soil profile across the site. These cross-sections reveal the elevations of the upper and lower contacts between the more transmissive units and the underlying and overlying clays. The predicted ages of the deposits are indicated by the numeric sequence of the strata, with the most recent strata identified with the highest number.

4.2.1 Existing Large and Proposed Storage Areas - Analysis of cone logs show three distinct transmissive zones (2, 6, and 7) in the upper 40 feet at the northern edge of the existing large storage area. Evidence from cone logs and the correlation boring indicate that although the sandy zones represent different periods of deposition they are all hydrologically connected. This fact can be best demonstrated by examining cone log number 7 and the correlation boring. Zones 6 and 7 consist of a red brown silty fine sand with occasional very thin (6 inches or less) discontinuous clayey seams. A characteristic thin clay zone was observed to separate zones 6 and 7. However, this clay zone is not significant enough to act as a hydrologic seal. Zone 7 is generally found at a depth of approximately 12 feet below the road surface on the dike top and varies in thickness from 3 feet to 15 feet. The top of zone 6 shows an appreciable amount of scour and therefore the top of this zone varies considerably in depth across the site, from 15 feet to 25 feet below surface. Zone 2 was only observed at two cone locations, numbers 4 and 7, as well as the correlation boring. Zone 2 was found at a depth of 37.5 feet in the correlation boring and exists as a medium to coarse grained gray sand.

An extent map, Figure 8 in Attachment 1, was prepared showing the general trend of the hydrologic unit, zones 2, 6, and 7. This unit occurs beneath the northern edge of the existing storage area roughly paralleling Rabbs Bayou running between the two storage areas. The unit trends approximately east to west. There is also evidence that a much smaller sand channel exists at the southern edge of the large existing storage area. This unit appears to be very limited in extent and therefore rather insignificant with respect to zones 2, 6, and 7.

4.2.2 Existing Northern Storage Area - The smaller existing storage area to the north is characterized by clay-silty clay in the upper 23 feet. Below the clay unit exists a thick sequence (at least 23 feet) of silty fine sand which contains occasional thin seams of clay. However, these clay seams are very thin and limited in extent and thus do not appear as being effective hydrologic barriers. Refer to cone logs 22 thru 25 and stratigraphic cross-sections E-E' and F'F'. The sandy interval appears to occur across the entire northern storage area.

5.0 CONCLUSIONS

The depositional history of the area has resulted in a complex stratigraphy across the site in which numerous transmissive zones exist in some locations as a stacked geometry of sand channels. Although these different sandy zones represent different periods of deposition, they must be treated as one hydrologic unit.

The large existing storage area is lined with 3 feet of compacted clay which would prevent contaminant migration. However, the transmissive zones are the potential contaminant migration pathway due to their proximity to the surface. Although these shallow zones are not major sources of groundwater, they can be used as small quantity sources for domestic and livestock use. Therefore, it must be concluded that groundwater monitoring of the near surface sand channel between the large existing and proposed storage areas is advisable.

The clay layer beneath the proposed storage area and the existing smaller storage area to the north is sufficient to preclude groundwater monitoring. Previous geological reports have indicated that this 20 foot thick clay layer has a permeability of less than 10^{-7} cm/sec. Although the depth to groundwater may only be ten feet or less as previously reported, this low permeability would inhibit any migration within the clay.

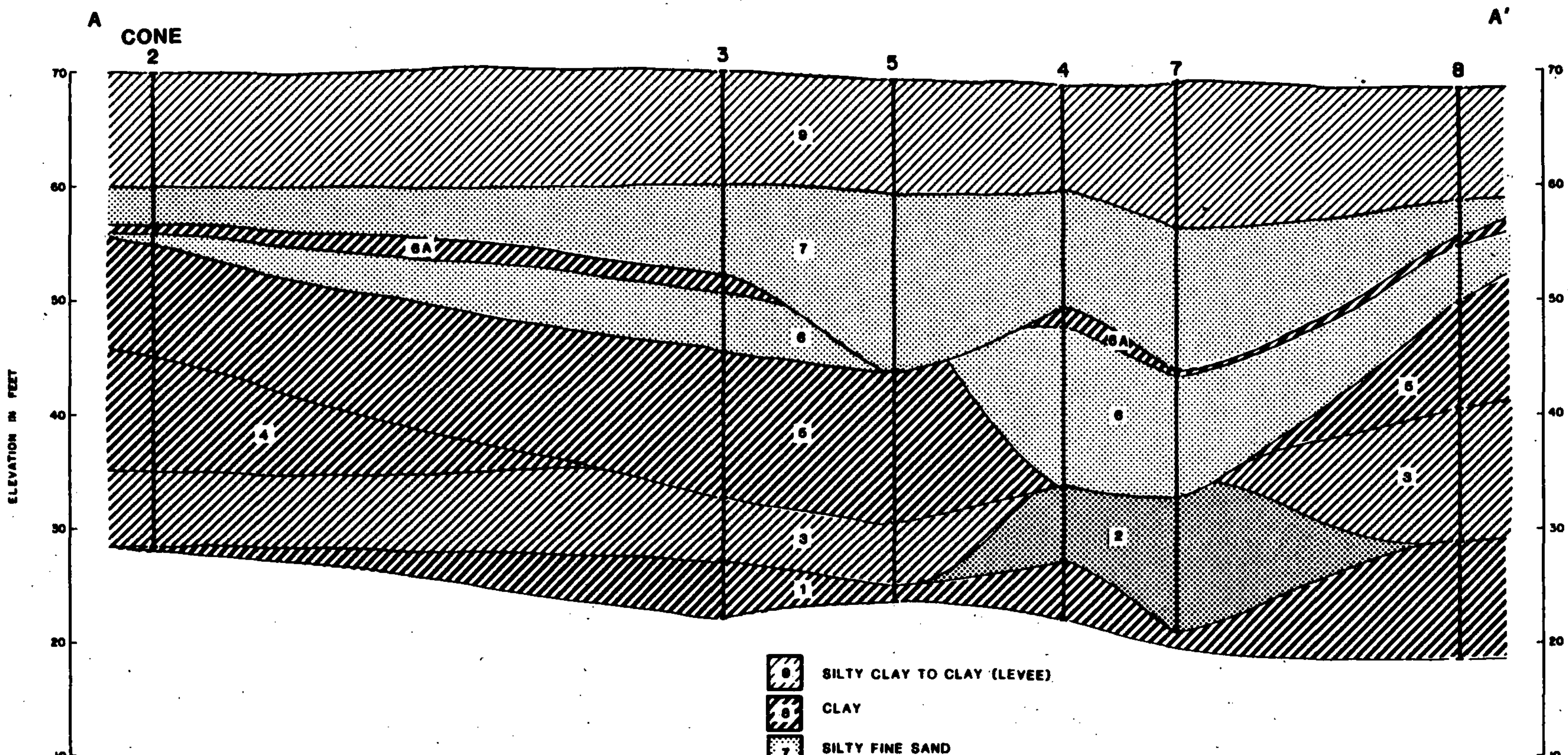
The small sand zone found on the north side of the large existing storage area is not considered a major potential contaminant migration pathway. It is quite thin and narrow and overlain with the 3 foot clay liner in place in the storage area.

Although the hydrologic unit identified between the existing large and the proposed storage areas is a potential migration pathway, there is no impact on the regional aquifers. These aquifers are several hundred feet below the surface and are overlain by the confining Beaumont clay. Therefore, no monitoring is necessary for these aquifers.

6.0 RECOMMENDATIONS

Although the potential for groundwater contamination is low, a conservative approach is recommended with the installation of monitoring wells within the shallow sand of zones 6 and 7. Two wells should be placed within the aerial extent of this hydrogeologic unit: one at the eastern edge and one at the western edge of the gap between the existing large and proposed storage areas shown in Figure 8. Both wells should screen the entire sand layer. This will help establish the hydraulic gradient and provide monitoring of the hydrogeologic unit.

No groundwater monitoring wells are recommended for the new disposal area or the northern area. The surface clay layer should be sufficient to inhibit contaminant migration from these above ground units.



- 9 SILTY CLAY TO CLAY (LEVEE)
- 8 CLAY
- 7 SILTY FINE SAND
- 6 SILTY FINE SAND
- 6A CLAY
- 5 CLAY
- 4 CLAY
- 3 SILTY CLAY WITH THIN SILT AND FINE SAND SEAMS
- 2 SAND
- 1 CLAY

0 50 100 150
HORIZONTAL SCALE IN FEET

NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN.
FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

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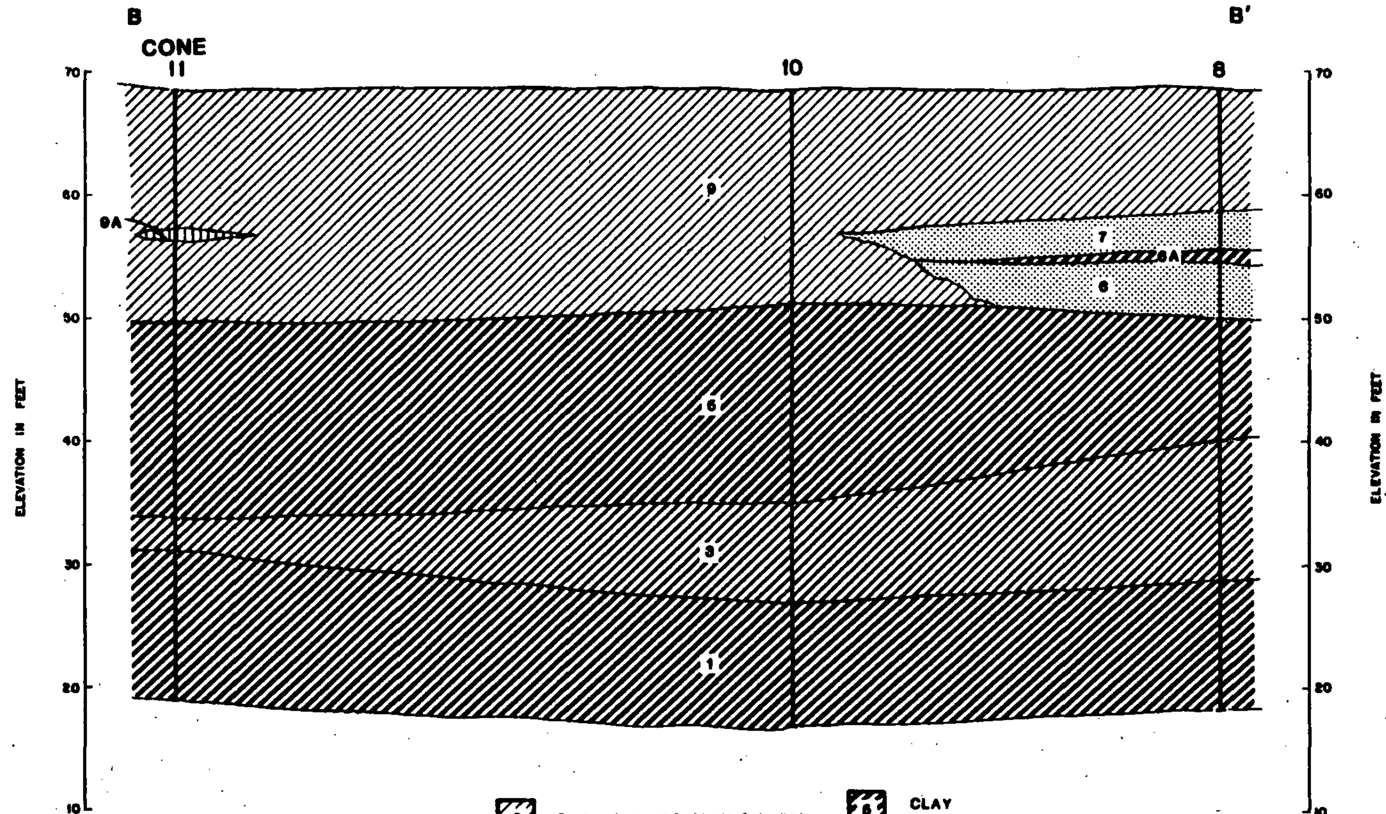
HOUSTON, TEXAS

FIGURE 3
STRATIGRAPHIC CROSS-SECTION A A'
HL&P PARISH PLANT

DRAWN BY: SJ	DATE: 10/6/85	PROJECT NO. 344-02

15



9 SILTY CLAY TO CLAY (LEVEE)
9A SILT
8 CLAY
7 SILTY FINE SAND
6 SILTY FINE SAND
6A CLAY
5 CLAY
4 CLAY
3 SILTY CLAY WITH THIN SILT AND FINE SAND SEAMS
2 SAND
1 CLAY

0 50 100 150
HORIZONTAL SCALE IN FEET

NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN. FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

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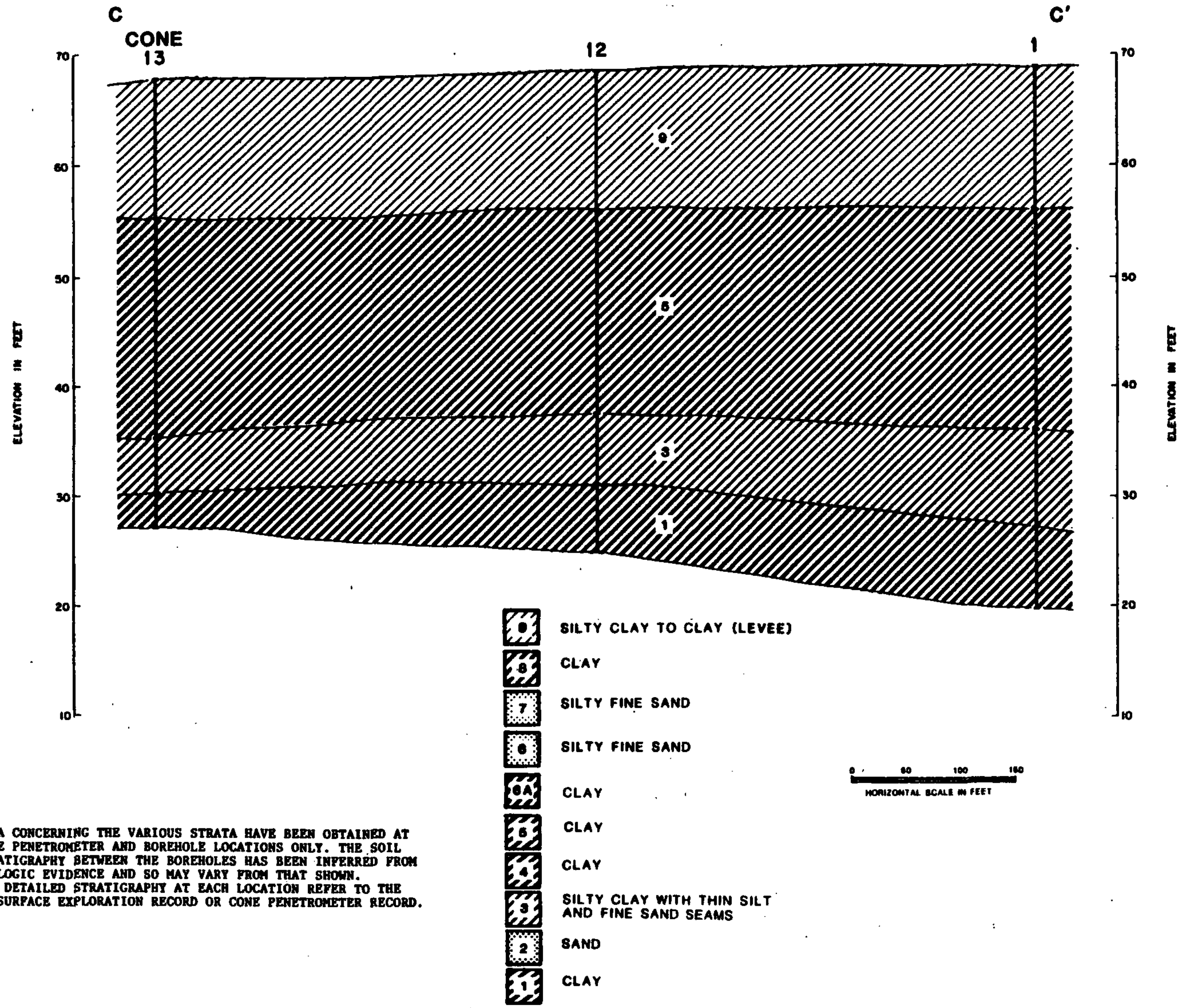
FIGURE 4
STRATIGRAPHIC CROSS-SECTION BB'
HL&P PARISH PLANT

DRAWN BY. SJ | DATE: 10/6/86 | PROJECT NO.: 344-02

16



NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN.
FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

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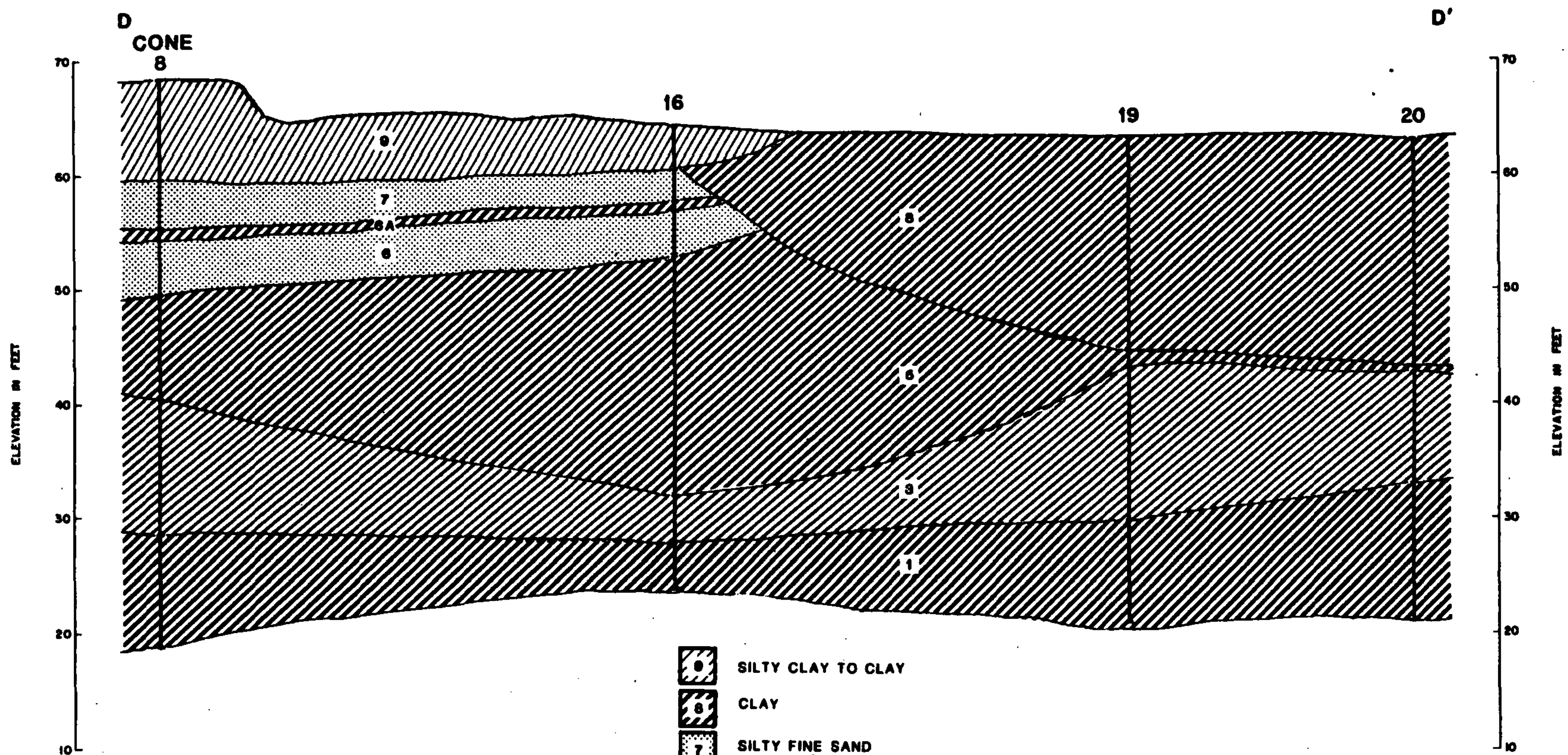
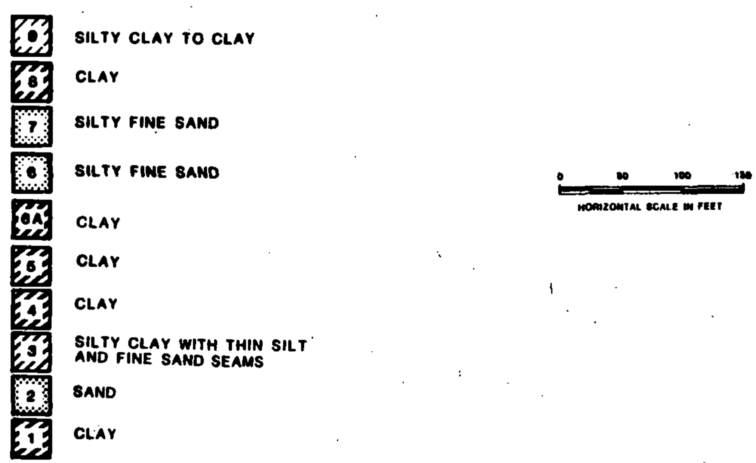
FIGURE 5
STRATIGRAPHIC CROSS-SECTION CC'
HL&P PARISH PLANT

DRAWN BY: SJ	DATE: 10/6/85	PROJECT NO: 344-02

17





NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN. FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

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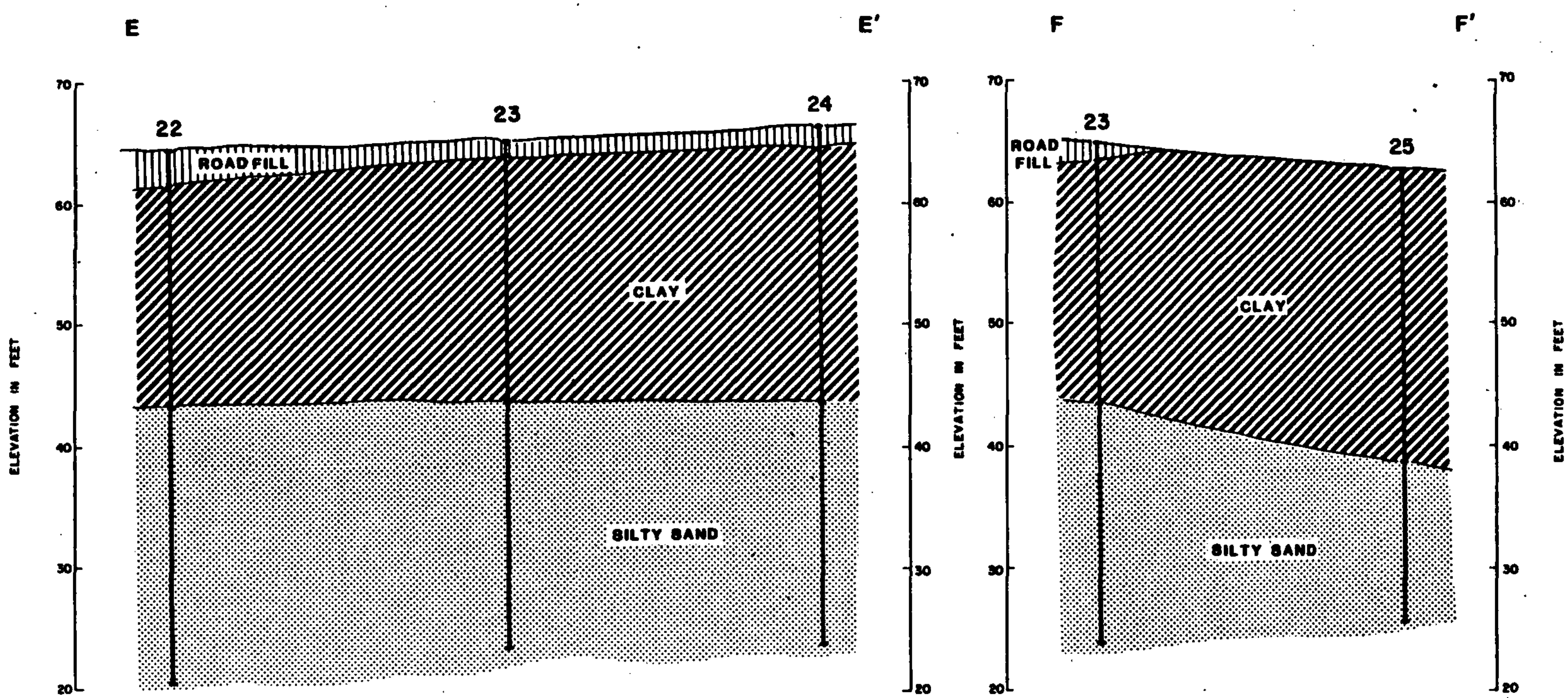
HOUSTON, TEXAS

FIGURE 6
STRATIGRAPHIC CROSS-SECTION DD'
HL&P PARISH PLANT

DRAWN BY: BJ	DATE: 10/8/85	PROJECT NO: 344-02



NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN. FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

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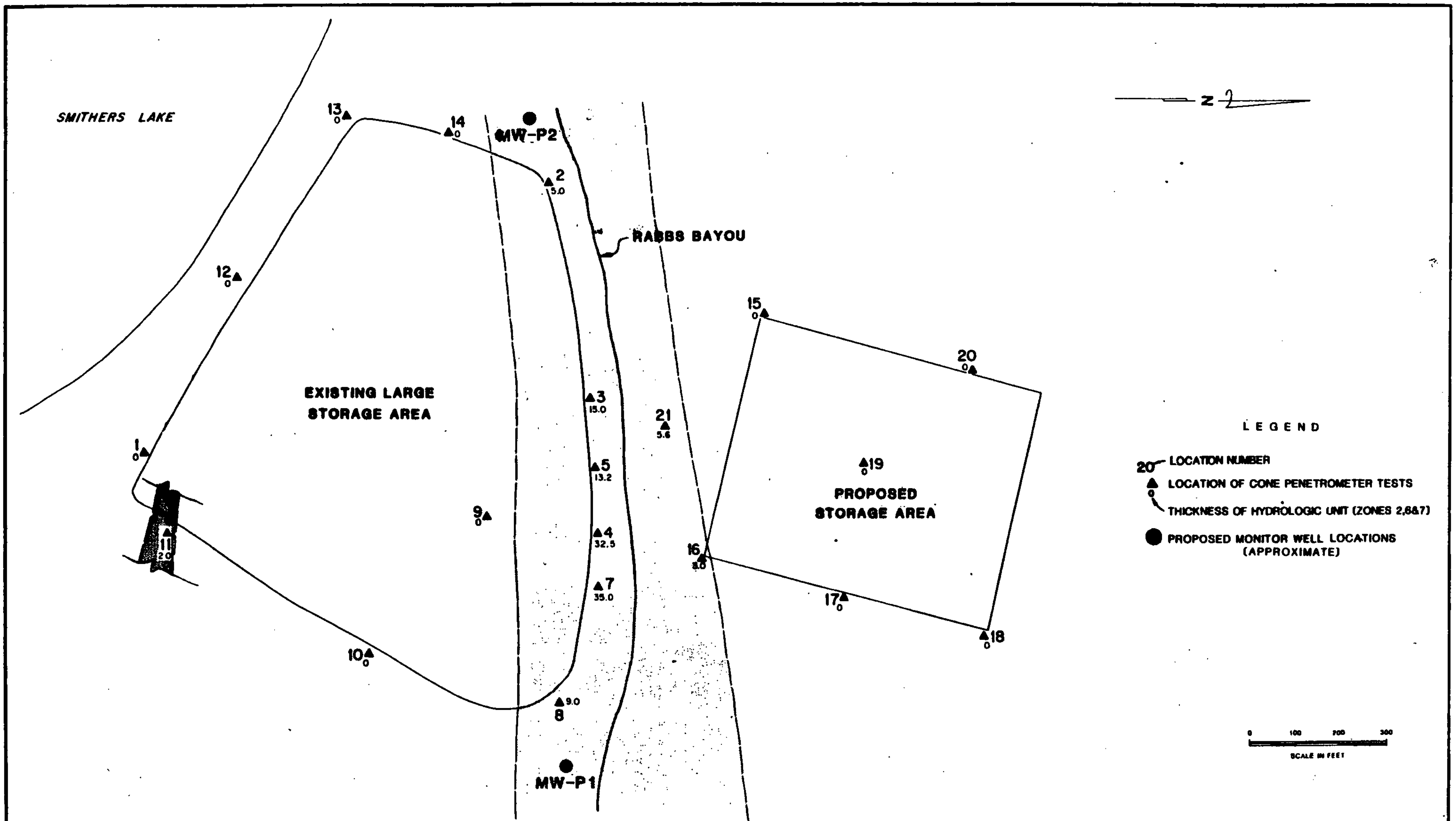
FIGURE 7
STRATIGRAPHIC
CROSS-SECTION EE' & FF'
HL&P PARISH PLANT

DRAWN BY: BJ | DATE: 10/8/86 | PROJECT NO.: 344-02



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HOUSTON, TEXAS

FIGURE 8
EXTENT MAP
NEAR SURFACE
HYDROLOGIC UNIT (ZONES 2,6 & 7)
HL&P PARISH PLANT

DRAWN BY SJ	DATE: 10/6/85	PROJECT NO 344 UE

Reference 15

II.D.5

Kearney/Centaur Division
A.T. Kearney, Inc.
P.O. Box 1438
225 Reinekers Lane
Alexandria, Virginia 22313
703 683 7932

Management Consultants

ATKEARNEY

December 9, 1988

Mr. Tom Clark
Regional Project Officer
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

Reference: EPA Contract No. 68-01-7374; Work Assignment No. R26-02-20; Houston Lighting & Power Company - W.A. Parish Generating Station; Thompsons, Texas; EPA I.D. No. TXD097311849; Clean-Closure Review

Dear Mr. Clark:

Enclosed please find the review of the State's Interim Status Clean-Closure determination for Houston Lighting & Power Company - W.A. Parish Generating Station (HLP - Parish) in Thompsons, Texas. This project called for the Kearney Team to review information in the State of Texas files that was used by the State in making a determination to allow clean-closure at the HLP - Parish facility. This review briefly discusses the background of the units that have undergone closure and describes the documentation for the closure process. Project deliverables include the following:

- A report documenting the findings of the review.
- The completed checklist (including general and unit-specific information).

The checklist uses two codes: N/A and NIF. N/A is used for items not considered applicable. NIF is used for items where information appears to be required, or may help characterize the adequacy of the procedures used to close a unit, but was not found in the file.

As you requested, we reviewed the file information for compliance with 40 CFR 264 and 265, as appropriate, EPA's interpretation of clean closure as described in the Federal Register (52 FR 8704, March 19, 1987), and other relevant policies and guidances.

The primary information sources for the review are included in a reference list at the end of the checklist.

The Outdoor Container Storage Area is the only documented unit that has undergone closure at the HLP - Parish facility. The Texas Water Commission (TWC) approved the Closure Plan as stated in a September 23, 1985 letter to HLP - Parish. The letter also states that an Affidavit of Exclusion will be processed upon completion of the closure activities and receipt of the Certification of Closure signed by an independent, registered professional engineer. The file chronology is confusing because an April 30, 1985 letter from TWC to the HLP - Parish facility indicated TWC had already accepted HLP - Parish withdrawing their application for a hazardous waste permit and their Affidavit of Exclusion.

There were a number of other waste management units identified during the file review; however, their function and status are unclear. A summary of these waste management units and a discussion of some of the unclear issues are included in the report.

Based on the information reviewed from TWC's files (specifically the Closure Plan and Certification of Closure, documenting how the unit was closed), closure of the Outdoor Container Storage Area has not met the closure performance standard of 40 CFR 265.111. The Closure Plan and Certification of Closure have not demonstrated how closure activities controlled, minimized, or eliminated post-closure escape of hazardous waste, hazardous constituents, contaminated run-off, or hazardous waste decomposition products to the ground or surface water or to the atmosphere.

If you have any questions or desire any additional information, please do not hesitate to call me or Dorothy La Russo, the Work Assignment Manager (who may be reached at 703/683-7932).

Sincerely,

Arthur Glazer

Arthur Glazer
Technical Director

Enclosures

cc: V. Cammack, EPA Region VI
J. Levin
D. Bean
D. La Russo
A. Schaffer
T. Bingman, B/TSA

II.D.5

CLEAN-CLOSURE REVIEW

Houston Lighting & Power Company
W.A. Parish Generating Station
Thompsons, Texas

EPA I.D. No. TXD097311849

Prepared for:

U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

Prepared by:

Kearney/Centaur Division
A.T. Kearney, Inc.
225 Reinekers Lane
Alexandria, Virginia 22314

Contract No. 68-01-7374
Work Assignment No. R26-02-20

December 1988

HOUSTON LIGHTING & POWER COMPANY
WA PARISH GENERATING STATION
THOMPSONS, TEXAS

EPA I.D. NO. TXD097311849

I. Description of Facility

The Houston Lighting & Power Company - WA Parish Generating Station (HLP-Parish) is located in Thompsons, Texas. The facility generates electric power through steam production. The Outdoor Container Storage Area (container storage area) is the only documented unit that has undergone closure at this facility.

II. Outdoor Container Storage Area

The container storage area is located on a concrete pad west of the oil separator pit and adjacent to the tricellerator. The container storage area managed 55-gallon drums of hazardous waste including spent solvents, paint thinners, oily wastes, miscellaneous oily wastes, sandblasting grit, and refractory bricks. A closure plan was approved by the Texas Water Commission (TWC) on September 23, 1985. Based on the file evaluation, the closure plan does not include information on the following: (References 1, 14, 23)

- volume of wastes;
- sampling and testing program for the wastes within the drums to identify hazardous constituents being disposed;
- demonstration that the containment system (i.e., concrete pad) has sufficient capacity to contain ten percent of the volume of the containers or the volume of the largest container, whichever is greater;
- integrity of the containment system;
- demonstration there have been no releases to soil and ground water;
- type of off-site disposal (e.g., incineration);
- health-based criteria to determine the potential health and environmental impacts of the waste residues;
- criteria for determining the extent of decontamination;
- detailed description of the decontamination steps (e.g., specifying the type of detergent to clean the pad);
- methods for sampling and testing to demonstrate success of decontamination; and

- run-off control during decontamination of the container storage area.

A letter from TWC to HLP - Parish dated April 30, 1985 accepted the Affidavit of Exclusion from the facility and withdrew the hazardous waste permit (Reference 12). A certification of closure, signed by an independent, registered professional engineer, for the container storage area was submitted to TWC on November 7, 1985 (Reference 23). HLP - Parish intends to manage drums containing hazardous and non-hazardous waste in the container storage area for less than 90 days after closure has been completed.

III. Other Units

- Table III-4, Hazardous Waste Facility Components List, identifies an enclosed drum storage area that managed drums containing waste paint thinners and spent solvents prior to off-site disposal. There was no information in the files regarding the status of the drum storage area or types and volumes of wastes stored. (Reference 5)

- A Compliance Monitoring Inspection conducted by TWC on August 18, 1984 identified a closed container storage area that at the time of the inspection was being used for less-than-90-day storage. There is no information describing whether this storage area is the same as the Outdoor Container Storage Area.

- The following information concerning three inorganic surface impoundments was stated in an October 9, 1984 letter from HLP to TWC:

  > "The three inorganic impoundments identified in Table III-2 (Hazardous Waste Management Facility Components List) and Table III-4 (Hazardous Waste Facility Components List) of the August 1980 Part A application were excavated in 1977 for temporary use during construction of Units 5 & 6. On an intermittent basis, the impoundments collected boiler blowdown and inorganic metal cleaning waste from pre-operational cleanings of Units 5 & 6. These wastes were then transferred to Units 5 & 6 concrete tank wastewater treatment system for treatment prior to NPDES discharge. Hazardous waste entered the impoundments on four separate occasions during pre-operational cleanings, the last event being an inorganic metal cleaning in September 1978."

"No wastewater entered the three impoundments after early 1980. The above-ground piping to the impoundments was removed during construction of Units 7 & 8 wastewater treatment system which was in service by June 1980. By March 1982, all three impoundments had been filled in and graded over. No dirt was removed from the impoundments during this activity." (Reference 7)

No other information was found in the files concerning the three surface impoundments and Units 5 through 8.

6

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

(Complete Sections I through IV for Entire Facility)

I. GENERAL INFORMATION

A. Facility Name: Houston Lighting & Power Company-W.A. Parish Generating Station

B. EPA I.D. No.: TXD097311849

C. Address: Y.H. Jones Road, Thompsons, TX

D. Check the type of unit/units closed or proposed to be closed and indicate the number of each type of unit that is being reviewed:

( ) Surface Impoundment ____
( ) Landfill ____
( ) Waste Pile ____
(X) Container Storage ____
( ) Tank ____
( ) Land Treatment ____
( ) Other (Describe) ____

II. INFORMATION SOURCE(S)

A. Check type of materials reviewed in completing the evaluation and provide the date of the documents:

(X) Part A Permit Application 11/18/80 (Reference 1)
( ) Part B Permit Application ____
( ) Interim Status Closure Plan 5/22/85 (Reference 14)
( ) RCRA Permit ____
( ) RCRA Facility Assessment ____
(X) Closure Certification 11/7/85 (Reference 23)
( ) CME Report ____
( ) Consent Agreement ____
( ) Sampling Results ____

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

(Complete Sections I through IV for Entire Facility)

I. GENERAL INFORMATION

A. Facility Name: Houston Lighting & Power Company-W.A. Parish Generating Station

B. EPA I.D. No.: TXD097311849

C. Address: Y.H. Jones Road, Thompsons, TX

D. Check the type of unit/units closed or proposed to be closed and indicate the number of each type of unit that is being reviewed:

- ( ) Surface Impoundment ____
- ( ) Landfill ____
- ( ) Waste Pile ____
- (X) Container Storage ____
- ( ) Tank ____
- ( ) Land Treatment ____
- ( ) Other (Describe) ____

II. INFORMATION SOURCE(S)

A. Check type of materials reviewed in completing the evaluation and provide the date of the documents:

- (X) Part A Permit Application 11/18/80 (Reference 1)
- ( ) Part B Permit Application (Reference 14)
- ( ) Interim Status Closure Plan 5/22/85
- ( ) RCRA Permit ____
- ( ) RCRA Facility Assessment ____
- (X) Closure Certification 11/7/85 (Reference 23)
- ( ) CME Report ____
- ( ) Consent Agreement ____
- ( ) Sampling Results ____

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

II. INFORMATION SOURCE(S) (Cont'd)

A. Check type of materials reviewed in completing the evaluation and provide the date of the documents (Cont'd)

( ) Other Correspondence (Describe)

(X) Other Materials (Describe) References 2-13, 15-22, 23-29

B. Briefly summarize interviews with Region and/or State personnel. Include the name(s) of the personnel interviewed and the date: Interviews were not conducted with Region and/or State personnel

III. ENVIRONMENTAL SETTING

A. Source of Data - Cite Reference Noted in Section II: NIF

B. Surface Water

(1) Annual Precipitation: NIF

(2) Annual Evaporation: NIF

(3) Net Annual Precipitation: NIF

(4) Distance to Nearest Surface Water and Description: NIF

* NIF = No Information Found

9

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

III. ENVIRONMENTAL SETTING (Cont'd)

B. Surface Water (Cont'd)

(5) Describe Facility Slope and Intervening Terrain: NIF

C. Geology

(1) Describe Soil Type: NIF

( ) Cohesionless

( ) Cohesive

(2) Predominant Soil Type in Accordance with USCS Classification System: NIF

( ) Clay

( ) Silty Clay

( ) Sandy Clay

( ) Clayey Silt/Clayey Sand

( ) Sandy Silt

( ) Other

(3) Test Results of Permeability: NIF

( ) Less than $1x10^{-7}$ cm/sec

( ) Greater than $1x10^{-7}$ cm/sec

(4) Test Procedures: Laboratory NIF ; Field NIF

Describe: NIF

(5) Is there consistency in test results of permeability? NIF

( ) Yes ( ) No

Describe inconsistency(ies)

10

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

III. ENVIRONMENTAL SETTING (Cont'd)

C. Geology (Cont'd)

(6) Soil Stratification: NIF

( ) Interbedded Soil Layers

( ) Continuous Layer

( ) Discontinuous Soil Horizon

( ) Other

D. Hydrogeology

(1) Source of data - cite reference noted in Section II: NIF

(2) Depth to ground water: Feet NIF ; Elevation NIF

(3) Direction of ground-water flow: NIF

(4) Is the site's ground water flow direction different from regional flow direction? ( ) Yes ( ) No NIF

(5) If no, flow direction is altered because of: NIF

( ) Drawdown induced by pumping

( ) Topographic features

( ) Structural features

( ) Other(s) (Describe) ______

(6) Presence of monitoring wells on site? ( ) Yes ( ) No NIF

(7) If yes, have unit specific constituents been detected?

( ) Yes ( ) No

Indicate last sampling date: NIF

(8) Is contamination statistically significant? NIF

( ) Yes ( ) No

(9) Are primary drinking water standards exceeded? NIF

( ) Yes ( ) No

If yes, indicate constituents and levels detected: ______

11

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

III. ENVIRONMENTAL SETTING (Cont'd)

D. Hydrogeology (Cont'd)

(10) Are secondary drinking water standards exceeded? NIF

( ) Yes ( ) No

If yes, indicate constituents and levels detected: __________

E. Receptor

(1) Source of data - cite reference noted in Section II: NIF

(2) Population within one-mile radius: NIF

(3) Population within three-mile radius: NIF

(4) Source and distance of potable water supply: NIF

( ) Surface water

( ) Municipal wells

( ) Private well

(5) Indicate depth to aquifer supplying drinking water: NIF

(6) Indicate endangered species in the area: NIF

IV. HEALTH AND SAFETY PROCEDURES

A. Is proposed decontamination of construction equipment described in sufficient detail? ( ) Yes ( ) No N/A*

If no, describe specific deficiencies: __________

B. Is rinsate disposal adequately described?

( ) Yes (X) No

* N/A = Not Applicable

12

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

(Complete Sections V through IX for Each Unit Under Review)

V. UNIT DESCRIPTION

A. Type of Unit:

( ) Surface Impoundment
( ) Landfill
( ) Waste Pile
(X) Container Storage
( ) Tank
( ) Land Treatment
( ) Other

B. Name, location or other information to identify the unit: Container Storage Area; west of the oil separator pit and adjacent to the tricellerator

C. Regulatory Basis for Closing the Unit (May Be More Than One): N/A

( ) 40 CFR 265
( ) 40 CFR 264
( ) Consent Agreement
( ) Waste accepted to the unit prior to July 26, 1982
( ) Waste accepted to the unit after July 26, 1982
( ) Unit closed after January 26, 1983

D. Did the State perform a site visit? ( ) Yes (X) No

If yes, indicate the name of the person conducting site visit, date and nature of the visit: ____________________

____

Summarize key findings of the visit including the status of clean-closure activities: ____________________

____

____

E. Closure Plan Approval Date by the State: 9/23/85

13

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

V. UNIT DESCRIPTION (Cont'd)

F. Closure Certification: (X) Yes ( ) No

If no, indicate schedule for Closure Certification: ____________

G. Is Closure Certification by a:

(X) Professional Engineer

(X) Independent Engineer

( ) Plant Engineer

( ) Other Person ____________

H. Is Closure Certification approved by the State? NIF

( ) Yes ( ) No

If no, describe the basis for non-approval: There is no documentation in the files indicating the state approved the certification

I. Dimensions of Unit

(1) Dimensions: Length NIF, Width NIF, Depth NIF

(2) Year of Construction:

Start-Up Date NIF

Inactive Date NIF

Closure Date 11/85

(3) Was a Liner(s) Required: ( ) Yes (X) No

(4) If Yes, Liner Type and Brief Description:

( ) Liner not installed, as required

( ) Clay liner ____________

( ) Geomembrane liner

( ) Combination of clay and geomembrane liner ____________

( ) Other liner (Describe) ____________

Briefly describe, the appropriateness of the liner of the site: ____________

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

V. UNIT DESCRIPTION (Cont'd)

J. Physical Status of the Unit:

(1) Thickness of liner(s) N/A

(2) QA/QC documentation N/A

(3) Briefly describe any problems identified with the liner:

K. History of Compliance/Enforcement Problems: ( ) Yes (X) No

L. If Yes, Describe Compliance/Enforcement Action:

M. Documents Reviewed by the State: NIF

Design Plan ( ) As Built Drawings ( )

Briefly discuss the adequacy of these documents: TWC evaluated the Closure Plan according to Title 31 of Texas Administrative Code (TAC) Sections 835.211-335.216, including the closure performance standard of 31 TAC 335.212

N. State's Basis for Approval of Clean-Closure: NIF

O. Describe proposed final use in the area of the unit: Containers storing hazardous waste for less than 90 days

VI. WASTE CHARACTERIZATION

A. Source of Data - Cite Reference Noted in Section II: References 14, 22, 23

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VI. WASTE CHARACTERIZATION (Cont'd)

B. Waste Managed

( ) Listed Waste (Describe Waste or Waste Types): NIF

(X) Characteristics

(X) Ignitability

( ) Corrosivity

(X) Reactivity

( ) Toxicity

(X) Appendix VIII Hazardous Constituents (Describe) Polyester resin, vinylester resin, acetone, MEKP

( ) Other hazards that pose a threat to public health and the environment (Describe) NIF

C. Quality Control procedures used in testing: ( ) Yes (X) No

D. If yes, were the procedures used adequate? ( ) Yes ( ) No

If no, describe deficiencies: No sampling/testing of the waste within the drums were performed

VII. WASTE REMOVAL/DECONTAMINATION

A. Source of Data - Cite Reference Noted in Section II: Reference 23

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

B. Cleanup Standards

(1) Cleanup standards used:

( ) Background

( ) Health based

(X) Other (Describe) Drums were removed and area scrubbed with a detergent (type of detergent was not described)

(2) Who established cleanup standards?

( ) State

( ) EPA

( ) Proposed by Applicant

(3) Basis for determining cleanup criteria: The area was scrubbed and rinsed. Rinse water was placed in drums

(4) Describe any numerical standards that were used to establish cleanup criteria: NIF

(5) Explain the adequacy of cleanup criteria: Did not clean the unit to health based criteria

(6) Indicate Quality Assurance/Quality Control procedures in establishing cleanup criteria: NIF

C. Waste Removal

(1) How was waste disposed? 11 drums of waste were transferred off site to Rollins Environmental Services

(2) Manifest for material moved off site: ( ) Yes ( ) No NIF

D. Liner, associated piping and contaminated subsoil removal:

(1) Source of data - cite reference noted in Section II: NIF

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

D. Liner, associated piping and contaminated subsoil removal (cont'd):

(2) Geomembrane liner: N/A

( ) Removal off site

( ) Decontamination (treated)

( ) Disposal on site after treatment

Describe decontamination procedure: ______

(3) Soil/clay liner: NIF

( ) Removal off site

( ) Decontamination (treated)

( ) Disposal on site after treatment

Describe decontamination procedure: ______

(4) Sampling scheme to characterize contamination in underlying soil: NIF

( ) Systematic

( ) Random

(5) How was material disposed off site? NIF

(6) Manifest for material moved off site: ( ) Yes ( ) No NIF

(7) Contaminated subsoil testing for waste constituents? NIF

( ) Yes ( ) No

(8) Is location of background soil sampling correct? NIF

( ) Yes ( ) No

If no, describe the deficiencies: Background soil sampling was not performed

17

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

D. Liner, associated piping and contaminated subsoil removal (cont'd):

(9) Nature of soil samples tested: NIF

( ) Grab

( ) Composite

Indicate depth of soil sampled: ______

(10) Is contamination of underlying soil adequately describe? NIF

( ) Yes ( ) No

If not, describe deficiencies: ______

(11) Decontamination/removal of leachate collection/removal system: NIF

( ) Yes ( ) No

E. Waste Removal from Surface Impoundment:

(1) Source of data - cite reference noted in Section II: N/A

(2) Were liquid and sludges treated and/or stabilized?

N/A

(3) Was procedure for removal of any liquid waste adequate?

( ) Yes ( ) No N/A

(4) Describe liquid waste removal procedure and name of facility accepting waste: N/A

(5) Was the plan for handling sludge adequate?

( ) Yes ( ) No N/A

If no, describe deficiencies: ______

(6) Manifest for off-site waste: ( ) Yes ( ) No N/A

18

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

F. Cleanup of Ground Water:

(1) Describe how potential contamination of ground water was addressed as a part of clean closure: N/A

(2) Did the unit have ground water monitoring wells?
( ) Yes (X) No
If no, did the Agency issue a waiver? ( ) Yes ( ) No N/A
If yes, did the wells detect waste constituents? N/A
( ) Yes ( ) No

(3) Is ground water monitoring required under clean closure?
( ) Yes (X) No

(4) Describe how the potential for release of waste constituents into the ground water was reconciled as a part of clean closure: N/A

VIII. OTHER CONSIDERATIONS

A. Describe any other available criteria used for the unit:
NIF

B. Was the clean-closure of the unit affected by the financial condition of the facility? ( ) Yes ( ) No NIF

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

C. Did the unit's location with respect to population affect the closure of the unit? ( ) Yes ( ) No NIF

If yes, describe: ______________________________

D. Was the unit's closure approvals affected by local constraints?

( ) Yes ( ) No NIF

If yes, describe the circumstances: ______________________________

IX. OTHER COMMENTS

The closure plan does not provide the following: volume of wastes; list of hazardous constituents; type of detergent to decontaminate the storage area; run-off control during washing & rinsing; sampling of wash water; and criteria to determine clean closure.

X. REFERENCES

1. Letter from Houston Lighting & Power Company (HL&P) to Texas Department of Water Resources (TDWR), Additions and Modifications to TDWR Hazardous Waste Permit Applications, September 30, 1980.

2. Part A Application for W.A. Parish Generating Station, November 18, 1980.

3. W.A. Parish Plant Site, Units 5 thru 8.

4. W.A. Parish Generating Station, Facility Components

5. U.S. Environmental Protection Agency's Review of Part A Application for W.A. Parish, August 6, 1981.

6. Conditions of Operation During Interim Status, EPA Region VI, August 6, 1981.

7. Revised Part A Application for W.A. Parish Generating Station, October 9, 1984.

8. Letter from HL&P to TDWR, Notification of Change in Waste Management Methods, October 26, 1984.

9. Letter from HL&P to TDWR, Request for Addition of Mercury Contaminated Waste to the Industrial Solid Waste Registration, March 21, 1985.

10. Interoffice Memorandum from Jim Feeley to Charles Eanes, TDWR, Hazardous Waste Permit Exclusion Review, April 10, 1985.

11. Letter from HL&P to TDWR, Affidavit of Exclusion, April 12, 1985.

12. Letter from TDWR to HL&P, Withdrawal of Hazardous Waste Permit, April 30, 1985.

21

13. letter from HL&P to TDWR, Expansion of Coal Combustion By-Product Storage Area, May 13, 1985.

14. Letter from HL&P to TDWR, Closure Plan for W.A. Parish Container Storage Area, May 22, 1985.

15. Letter from TDWR to HL&P Publication of Notice of Receipt of Final Facility Closure Plans, July 30, 1985.

16. Letter from HL&P to U.S. EPA and TDWR, EPA Administrative Order Monitoring Data, August 2, 1985.

17. Letter from HL&P to TDWR, Revisions to Houston Lighting & Power Company's Revisions to Houston Lighting & Power Company's Solid Waste Regulations, August 5, 1985.

18. Letter from HL&P to TDWR, Publication of Notice of Final Facility Closure, August 29, 1985.

19. Letter from Analytical Petroleum Research Laboratories to HL&P, August 8, 1985, Results of Sampling Conducted, August 30, 1985.

20. Letter from Texas Water Commission (TWC) to HL&P, Approval of Drum Storage Area Closure Plan, September 23, 1985.

21. Letter from HL&P to TWC, Revisions to Houston Lighting & Power Company's Solid Waste REgulations, September 26, 1985.

22. Letter from HL&P to TWC, Addition to Industrial Solid Waste Registration, November 1, 1985.

23. Letter from HL&P to TWC, Certification of Closure of Container Storage Area, November 7, 1985.

24. Letters from TWC to HL&P, Evaluation Construction and Closure Plans/Specifications for 30-Acre Landfill, November 13, 1985.

25. Letter from TWC to U.S. EPA Region VI, Addition of Closure Certification to W.A. Parish Part B Permit Application, November 19, 1985.

26. Interoffice Memorandum from Rex Coffman to Ann McGisley, TWC, Amendments to Land Disposal Universe, July 28, 1986.

27. Notice of Registration, July 17, 1987.

28. Notice of Registration, September 27, 1988.

29. Interoffice Memorandum from Jeff Korth, TWC, to File, Review of Hazardous Waste Land Disposal Operations, Undated.

Reference 16

Report 277

RECORDS OF WELLS, DRILLERS' LOGS, WATER-LEVEL MEASUREMENTS, AND CHEMICAL ANALYSES OF GROUND WATER IN BRAZORIA, FORT BEND, AND WALLER COUNTIES, TEXAS, 1975-79

TEXAS DEPARTMENT OF WATER RESOURCES

July 1983

TEXAS DEPARTMENT OF WATER RESOURCES

REPORT 277

RECORDS OF WELLS, DRILLERS' LOGS, WATER-LEVEL MEASUREMENTS, AND CHEMICAL ANALYSES OF GROUND WATER IN BRAZORIA, FORT BEND, AND WALLER COUNTIES, TEXAS, 1975-79

By

Karl W. Ratzlaff, C. E. Ranzau,
and W. B. Lind
U.S. Geological Survey

This report was prepared by the U.S. Geological Survey
under cooperative agreement with the
Texas Department of Water Resources

July 1983

Table 6.—Drillers' Logs of Wells in Fort Bend County—Continued

Well JY-65-28-710—Continued

	THICKNESS (feet)	DEPTH (feet)
Clay, red	25	110
Sand and gravel	45	155
Clay, red to gray	30	185
Sand, fair coarse	30	215
Clay, gray	10	225
Sand, good coarse	17	242

Well JY-65-28-711

Owner: Arthur Kennedy

Driller: Ellis Water Well Service

	THICKNESS (feet)	DEPTH (feet)
Top soil-reddish brown	6	6
Clay-red to gray mixed	26	33
Sand and gravel, strips	57	90
Clay, red to gray	20	110
Sand and gravel strips	50	160
Clay, red-gray sticky	40	200
Sand, fair coarse	10	210
Clay, gray	11	221
Sand, very coarse and gravel	22	243

Well JY-65-29-812

Owner: Bud Romine

Driller: Almeda Water Well Service

	THICKNESS (feet)	DEPTH (feet)
Fill and soil	6	5
Clay, gray to red	14	19
Sand, brown	10	29
Clay, blue	28	61
Sand, white	10	71
Clay, red	66	137
Sand, brown	14	151
Clay	2	153
Sand, white	19	172
Clay, red	1	172

Well JY-65-35-306

Owner: Houston Lighting and Power Co., well 4

Driller: Layne-Texas

	THICKNESS (feet)	DEPTH (feet)
Clay	17	17
Sand	16	33
Clay	29	62
Sand	21	83
Clay	9	92
Sand	27	119

Well JY-65-35-306—Continued

	THICKNESS (feet)	DEPTH (feet)
Clay	68	187
Sand	25	212
Shale, sandy and sand	25	237
Shale and sandy shale	47	284
Sand and shale streaks	14	298
Shale	21	319
Sand and sandy shale	7	326
Shale and sand streaks	45	371
Sand and sandy shale	32	403
Shale	17	420
Shale, sandy	9	429
Shale	5	434
Sand and shale streaks	78	512
Shale	7	519
Sand and shale	29	548
Sand	10	558
Sand and shale streaks	10	568
Shale	12	580
Sand and sandy shale	30	610
Shale	6	616
Sand and shale breaks	15	631
Shale	26	657
Sand and shale breaks	31	688
Shale and sand streaks	14	702
Sand and shale streaks	26	728
Sand and shale	18	746
Sand	15	761
Shale	4	765
Sand and shale	20	785
Shale	6	791
Sand and sandy shale	47	838
Shale and sand streaks	5	843
Sand and shale	6	849
Shale	2	851

Well JY-65-35-307

Owner: Houston Lighting and Power, well 6

Driller: Layne-Texas Co.

	THICKNESS (feet)	DEPTH (feet)
Fill	2	2
Clay	6	8
Sand and gravel	114	122
Shale	10	132

Table 6.—Drillers' Logs of Wells in Fort Bend County—Continued

	THICKNESS (feet)	DEPTH (feet)
Well JY-65-35-307—Continued		
Sand	15	147
Shale	53	200
Sand	28	228
Shale and sand streaks	64	282
Sand	19	301
Shale	19	320
Sand	19	339
Shale	36	375
Sand	25	400
Sand, gravel and shale streaks	37	437
Sand	63	500
Shale	9	509
Sand, broken with shale	21	530
Shale	6	536
Sand	29	565
Shale	17	582
Sand, broken with shale	17	599
Shale	19	618
Sand	20	638
Shale	9	649
Sand	10	659
Shale	9	668
Sand	26	694
Shale	16	710
Sand	21	731
Shale	26	757
Sand	18	775
Shale	15	790
Sand	12	802
Sand, broken with shale	38	840
Shale	10	850
Well JY-65-35-802		
Owner: Texas Gulf Sulphur Co.		
Driller: J. L. Dickson		
Missing	156	156
Sand	31	187
Shale	45	232
Sand and gravel	64	296
Shale	15	311
Shale	9	320
Sand	69	389
Shale and sand strips	29	418
Sand with shale	22	440
Sand and gravel	46	486
Shale	7	493

	THICKNESS (feet)	DEPTH (feet)
Well JY-65-35-802—Continued		
Sand and gravel	21	514
Shale, sticky	21	535
Sand	5	540
Shale, sandy	26	566
Shale, sandy	20	586
Sand	42	628
Shale	20	648
Well JY-65-36-107		
Owner: Virgle Boll		
Driller: B. J. Swinehart Co.		
Clay	10	10
Sand and gravel	75	85
Clay	15	100
Sand	11	111
Clay	31	142
Sand	28	170
Clay	23	193
Sand	15	208
Clay	15	223
Sand	15	238
Well JY-65-37-201		
Owner: Continental Homes Co.		
Driller: Almeda Water Well Service		
Soil	2	2
Clay, gray to red	12	14
Sand, brown	25	39
Clay, blue	2	41
Sand, white	26	67
Clay	1	68
Well JY-65-37-202		
Owner: R. L. Cooper		
Driller: Abner J. Joehlin		
Soil, black	6	6
Clay, red	24	30
Missing	10	40
Well JY-66-24-301		
Owner: Jim Skipton		
Driller: Bussell and Son, Inc.		
Clay, red	3	3
Gravel	33	36
Clay	80	116
Sand	40	156

Table 7.—Water Levels in Wells in Fort Bend County—Continued

DATE		WATER LEVEL
Well JY-65-35-101—Continued		
Aug.	9, 1978	31.60
Feb.	28, 1979	30.95
Aug.	3, 1979	32.24
Well JY-65-35-102		
Owner: Gulf Oil Corp.		
Elevation: 81		
Completion Interval: -180		
Jan.	15, 1975	26.13
Aug.	8, 1975	26.60
Jan.	14, 1976	26.99
Jan.	7, 1977	25.59
Aug.	3, 1977	26.97
Feb.	28, 1979	28.09
Aug.	3, 1979	28.12
Well JY-65-35-302		
Owner: Houston Light and Power W. A. Parrish Plant, well 1		
Elevation: 74		
Completion Interval: 540-690		
Aug.	8, 1975	97
Dec.	5, 1975	99
Jan.	7, 1977	102
Feb.	18, 1977	103
Mar.	17, 1977	103.5
Apr.	22, 1977	100
May	20, 1977	100
June	17, 1977	103
July	8, 1977	105
Aug.	5, 1977	108
Sept.	9, 1977	108
Oct.	7, 1977	108.5
Dec.	9, 1977	108
Jan.	6, 1978	108
Mar.	3, 1978	107
May	12, 1978	108
July	28, 1978	112
Aug.	18, 1978	113
Well JY-65-35-302—Continued		
Sept.	22, 1978	114
Oct.	6, 1978	114
Jan.	8, 1979	114
Well JY-65-35-303		
Owner: Houston Light and Power W. A. Parrish Plant, well 2		
Elevation: 72		
Completion Interval: 457-720		
Aug.	8, 1975	99
Dec.	5, 1975	95
Jan.	7, 1977	99
Feb.	18, 1977	98
July	28, 1978	109
Aug.	18, 1978	111
Sept.	22, 1978	110
Oct.	6, 1978	110
Jan.	8, 1979	105
Well JY-65-35-304		
Owner: Houston Light and Power W. A. Parrish Plant, well 3		
Elevation: 70		
Completion Interval: 453-836		
Aug.	8, 1975	102
Dec.	5, 1975	102
Jan.	7, 1977	105
Feb.	18, 1977	103
Mar.	17, 1977	103
Apr.	22, 1977	102
May	20, 1977	103
June	17, 1977	105
July	8, 1977	106
Aug.	5, 1977	110
Sept.	9, 1977	111
Oct.	7, 1977	111
Nov.	10, 1977	113
Jan.	6, 1978	110
Mar.	3, 1978	111
Well JY-65-35-304—Continued		
May	12, 1978	111
July	28, 1978	115
Aug.	18, 1978	115
Sept.	22, 1978	117
Oct.	6, 1978	118
Jan.	8, 1979	118
Well JY-65-42-301		
Owner: C. A. Danklef		
Elevation: 77		
Completion Interval: -545		
Jan.	17, 1975	21.43
Jan.	14, 1976	21.71
Jan.	12, 1977	21.56
Well JY-65-43-101		
Owner: C. A. Danklef		
Elevation: 76		
Completion Interval: 275-1,195		
Jan.	17, 1975	72.97
Jan.	13, 1976	76.13
Jan.	12, 1977	79.47
Mar.	17, 1978	77.71
Feb.	22, 1979	84.78
Aug.	3, 1979	94.15
Well JY-65-43-602		
Owner: Unknown		
Elevation: 57		
Completion Interval: -482		
Jan.	17, 1975	71.97
Aug.	8, 1975	94.10
Jan.	13, 1976	73.37
Aug.	4, 1976	91.63
Jan.	17, 1977	73.20
Aug.	3, 1977	96.82
Mar.	21, 1978	76.44
Aug.	9, 1978	95.75
Feb.	22, 1979	80.74
Aug.	6, 1979	93.57

Table 8.--Chemical Analyses of Water from Wells in Fort Bend County

When no potassium (K) is reported, sodium and potassium are calculated and reported as sodium (Na)
Water-bearing unit: C, Chicot aquifer; CL, lower unit of Chicot aquifer; E, Evangeline aquifer

Well	Owner	Depth or producing interval (ft)	Water-bearing unit	Date	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (ug/l)	Dissolved manganese (Mn) (ug/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Carbonate (CO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrite plus nitrate (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved boron (B) (ug/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Percent sodium	Residual sodium carbonate (RSC)	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH	Temperature (°C)
1/ JY-65-19-807	Texas Department of Corrections	760-1,025	E	Sept. 25, 1978	18	80 2/	50 3/	29	6	68	--	229	0	13	30	0.3 4/	--	--	--	277	97	--	--	--	433	7.94	--
1/ 20-711	City of Sugarland	920-1,650	E	Aug. 28, 1975	18	70 2/	20 3/	28	5	88	--	242	0	18	45	.6 4/	--	--	--	321	90	--	--	--	531	7.47	--
1/ 901	Fort Bend County Water Control and Improvement District No. 2	910-1,660	E	Jan. 18, 1978	22	50 2/	50 3/	33	6	61	--	235	0	7	28	.2 4/	--	--	--	273	107	--	--	--	472	7.97	--
1/ 27-106	Pecan Grove Municipal Utilities District	734-1,389	E	July 5, 1978	19	60 2/	50 3/	32	6	69	--	231	0	9	40	.4 4/	--	--	--	288	105	--	--	--	441	7.73	--
302	Fort Bend Utilities, Well 8	1,260-1,560	E	Feb. 10, 1975	--	--	--	--	--	--	--	256	0	17	62	--	--	--	--	--	--	--	--	--	621	7.7	30.0
302	do	1,260-1,560	E	Mar. 16, 1976	--	--	--	--	--	--	--	258	0	.0	60	--	--	--	--	--	--	--	--	--	622	7.9	--
302	do	1,260-1,560	E	Feb. 25, 1977	--	--	--	--	--	--	--	243	0	9.6	62	--	--	--	--	--	--	--	--	--	589	7.5	29.0
302	do	1,260-1,560	E	Mar. 1, 1979	--	--	--	--	--	--	--	250	0	18	49	--	--	--	--	--	--	--	--	--	589	7.7	29.0
303	Fort Bend Utilities, Well 9	503-865	E	Feb. 25, 1977	--	--	--	--	--	--	--	260	0	14	59	--	--	--	--	--	--	--	--	--	617	8.0	28.0
303	do	503-865	E	Mar. 1, 1979	--	--	--	--	--	--	--	240	0	12	62	--	--	--	--	--	--	--	--	--	535	7.3	26.0
313	Fort Bend Utilities, Well 7	501-721	E	May 16, 1978	--	--	--	--	--	--	--	240	0	8.0	71	--	--	--	--	--	--	--	--	--	623	7.3	--
1/ 322	Texas Department of Corrections	321-395	C	Jan. 22, 1975	20	90 2/	20 3/	83	11	31	--	264	0	0	72	.2 4/	--	--	--	347	252	--	--	--	610	7.30	25.5
6/ 504 6/	Plantation Municipal Utilities District	509-799	C	May 23, 1978	24	60	10	40	6.7	59	3.6	--	--	18	32	--	--	0.8	--	--	77	--	--	--	526	--	--
1/ 28-103 1/	City of Cities	580-980	C, E	May 25, 1974	22	150 2/	40 3/	59	11	42	--	253	0	15	44	.3 4/	--	--	--	317	192	--	--	--	600	7.48	--
1/ 207 1/	Meadowcreeks Municipal Utilities District	685-1,111	CL, E	Dec. 18, 1974	22	100 2/	20 3/	44	7	--	--	239	0	16	27	.3 4/	--	--	--	--	138	--	--	--	470	7.41	--
1/ 208 1/	Quail Valley Utilities District	725-1,305	E	Apr. 12, 1978	23	50 2/	50 3/	39	7	52	--	233	0	9	27	.3 4/	--	--	--	272	126	--	--	--	458	7.66	25.5
1/ 507 1/	Thunderbird Utilities District	1,007-1,150	E	Jan. 28, 1977	21	60 2/	20 3/	40	7	56	--	237	0	12	30	.4 4/	--	--	--	282	128	--	--	--	458	7.60	--
5/ 604 5/	Thunderbird Utilities District, Thunderbird, North Subdivision	626-1,299	CL, E	June 24, 1975	8	100	20	13.4	3.9	120.3	--	278.2	0	14.6	48	.7	--	--	--	345	49	--	--	--	600	8.05	27
7/ 702	Glen R. Shultz	236-246	CL	Dec. 16, 1976	20	100 2/	--	61	12	40	--	268	0	11	44	.3	--	--	--	320	202	--	--	--	536	8.1	--
7/ 703 7/	Lee M. Brawner	--	CL	Dec. 14, 1976	18	2,300 2/	--	47	9	39	--	232	0	< 4	33	.3	--	--	--	260	154	--	--	--	437	8.1	--
7/ 704 7/	John B. Hacty	223-233	CL	do	21	100 2/	--	90	11	47	--	283	0	4	93	.3	--	--	--	405	271	--	--	--	694	7.9	--
7/ 705 7/	Robert C. Newton	227-237	CL	do	23	100 2/	--	68	14	40	--	284	0	< 4	54	.3	--	--	--	339	227	--	--	--	573	8.2	--
7/ 706 7/	Mr. Newberne	240-250	CL	do	20	300 2/	--	65	13	38	--	259	0	11	52	.3	--	--	--	326	217	--	--	--	555	7.8	--

See footnotes at end of table.

Table 8.--Chemical Analyses of Water from Wells in Fort Bend County--Continued

Well	Owner	Depth or producing interval (ft)	Water-bearing unit	Date	Dissolved silica (SiO_2) (mg/l)	Dissolved iron (Fe) (ug/l)	Dissolved manganese (Mn) (ug/l)	Dissolved calcium (Ca) (mg/l)	Dissolved magnesium (Mg) (mg/l)	Dissolved sodium (Na) (mg/l)	Dissolved potassium (K) (mg/l)	Bicarbonate (HCO_3) (mg/l)	Carbonate (CO_3) (mg/l)	Dissolved sulfate (SO_4) (mg/l)	Dissolved chloride (Cl) (mg/l)	Dissolved fluoride (F) (mg/l)	Dissolved nitrite plus nitrate (N) (mg/l)	Dissolved orthophosphorus (P) (mg/l)	Dissolved boron (B) (ug/l)	Dissolved solids (sum of constituents) (mg/l)	Hardness (Ca, Mg) (mg/l)	Percent sodium	Residual sodium carbonate (RSC)	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH	Temperature (°C)
7/ JY-65-28-707	Charles J. Shuman	293-303	CL	Dec. 14, 1976	25	200 2/	--	480	111	640	--	481	0	29	1,840	0.2	--	--	--	3,360	1,650	--	--	--	5,410	8.0	--
7/ 708	Bill Cayan	229-239	CL	do	21	1,300 2/	--	63	12	40	--	267	0	12	48	.3	< 0.4	--	--	327	206	--	--	--	550	8.0	--
7/ 709	Drake Williams	293-303	CL	do	20	200 2/	--	59	13	44	--	290	0	< 4	40	.4	< .4	--	--	319	201	--	--	--	535	8.2	--
7/ 710	Peter Mellen	232-242	CL	do	21	2,000 2/	--	343	72	132	--	346	0	5	810	.2	< .4	--	--	1,550	1,150	--	--	--	2,750	7.5	--
7/ 711	Arthur Kennedy	233-243	CL	do	21	100 2/	--	72	12	41	--	277	0	9	59	.3	< .4	--	--	350	230	--	--	--	585	8.2	--
29-104	City of Houston Mayfair Park	735-895	E	Mar. 19, 1976	--	--	--	--	--	--	--	255	0	14	63	--	--	--	--	--	--	--	--	--	626	7.5	26.0
104	do	735-895	E	May 16, 1978	--	--	--	--	--	--	--	260	0	13	66	--	--	--	--	--	--	--	--	--	640	7.4	--
104	do	735-895	E	June 28, 1979	--	--	--	--	--	--	--	260	0	--	--	--	--	--	--	--	--	--	--	--	640	7.5	27.0
1/ 35-306	Houston Lighting and Power Co. No.4	460-832	CL, E	Oct. 27, 1975	18	110 2/	30 3/	40	4	61	--	244	0	13	26	.3 4/	.6	--	--	282	116	--	--	--	470	7.45	23.5
1/ 307	Houston Lighting and Power Co.	400-838	C	June 15, 1979	22	90 2/	60 3/	45	7	51	--	251	0	12	24	.4 4/	< .1	--	--	285	141	--	--	--	478	7.48	--

1/ Analyzed by the Edna Wood Laboratories.
2/ Total iron (Fe).
3/ Total Manganese (Mn).
4/ Total Fluoride (F).
5/ Analyzed by the Curtis Laboratories.
6/ Analyzed by the Waste and Industrial Waste Laboratories, Inc.
7/ Analyzed by Texas Department of Health Resources Laboratories.

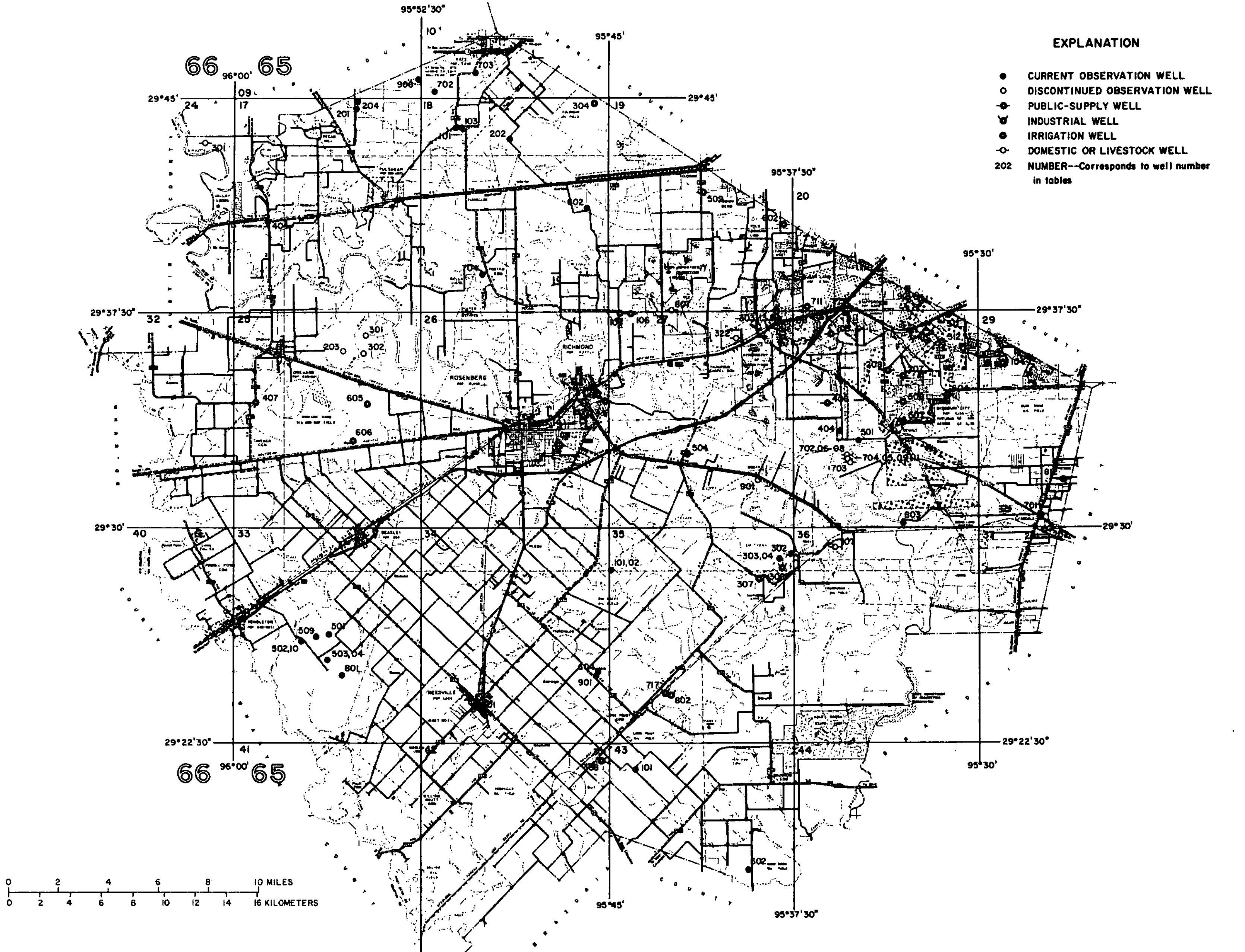


Figure 2

Location of Wells in Fort Bend County

Base from Texas Department of Highways and Public Transportation

Reference 17

TEXAS DEPARTMENT OF WATER RESOURCES
Industrial Solid Waste Disposal Compliance Monitoring Inspection

NON-MAJOR

Inspection Cover Sheet (see reverse side for checklist use and general instructions)

*Treatment/Disposal/Storage Facility Yes (Yes or No)

Compliant ______ Texas Permit/Reg. No. 31631

Noncompliant ✓ EPA I.D. No. TXD009731849

Site Operator Information:

Name of Company Houston Lighting and Power Company Parish Plant

Company's Address P.O. Box 1700

Houston Tx Phone No. 713-922-2211

Site Address Jones Rd (2759) Tompson Tx

Phone No. ______ County Fort Bend

Type of Industry Electrical Power generation

Indicate below Classes of Waste managed (Hazardous-H, Class I nonhazardous-NH, Class II-

Generator H, NH Transporter ______ Small Quantity Generator ______

Treatment H Disposal II, III Storage H, NH; 90 Day Exemption Application Submitted 5/84

Site Information (T.S.D. facilities only)

1. Are facilities located outside the 100 year flood plain area? Yes
2. Describe land use within one mile Agricultural, undeveloped
3. Closed or abandoned facilities NA

Inspection Information:

1. Inspector's Name & Title Karen Droz Friebus Field Representative
2. Inspection Date 7/27/84
3. Inspection Participants Bobbie Pease

Approved: Merton J Coloton
District Supervisor

Signed: Karen Droz Friebus
Inspector

Date: 8/13/84

Revised 9/30/83 - FFY 1984

*Note: For permitted or unpermitted T.D.S. waste handler, a Group II Appendix shall be attached to this report.

INDUSTRIAL SOLID WASTE

Non-Major
Compliance Monitoring Inspection Report
Generators and Facilities Checklist

Section A - Manifest

1. TDWR manifest is properly completed. Yes ✓ No___ N/A___

Note: If generator is a small quantity generator, manifesting is the only pretransport requirement.

Section B - Hazardous Waste Determination

1. On a copy of the registration, note generated solid waste(s) listed in Part 261 Subpart D with "L" (listed) and solid waste(s) that exhibit hazardous characteristics (corrosivity, ignitability, reactivity, EP toxicity) with "C" (characteristic).

2. If notification or disposition of waste stream changes is not current, explain in comments sheet. See Comments

Section C - Recordkeeping and Reports

1. Generator maintains the required records and reports for 3 years. Yes ✓ No___

Section D - General Facility Standards

1. Proof of deed recordation of on-site disposal facilities has been provided to the agency. Yes ✓ No___ N/A___
2. All spills have been reported. Yes ✓ No___ N/A___

NOTE: Attach a sketch of facilities. For all nonhazardous facilities do not complete the remainder of this Checklist. Use specific type facility checklists (from Group II form) and complete one checklist for each disposal facility.

STOP HERE IF FACILITY IS A SMALL QUANTITY GENERATOR.

Section E - Pretransport Requirements

(According to ______________________ Name, Owner/Operator)

1. Generator appears to have standard procedures for packaging, labeling and marking of hazardous waste. Yes ✓ No___ N/A___

2. Accumulation Time - (May accumulate hazardous waste for up to 90 days without a permit).

   a. Each container used to temporarily store waste before transport is clearly dated. Yes ✓ No___ N/A___

b. Containers and/or tanks are labeled "Hazardous Waste" while being accumulated on-site. Yes ✓ No___ N/A___

c. Containers are inspected for leakage or corrosion at least weekly. Yes ✓ No___ N/A___

d. Containers holding ignitable or reactive waste are located at least 15 meters (50 feet) from the facility's property line. Yes ✓ No___ N/A___

e. Containers holding incompatible waste and materials are properly separated and protected if containers leak or break. Yes ✓ No___ N/A___

NOTE: If tanks are used, fill out checklist for tanks.

Section F - Personnel Training

1. Owner/operator maintains adequate Personnel Training Records at the facility. Yes ✓ No___

Section G - Preparedness and Prevention

1. Owner/operator has attempted to obtain agreements with police, fire departments, emergency response teams, emergency response contractors, and equipment suppliers, as appropriate. Yes ✓ No___

2. Emergency information is readily available to the emergency coordinator. Yes ✓ No___

Section H - Contingency Plan and Emergency Procedures

1. An adequate contingency plan is maintained at the facility. Yes ✓ No___

STOP HERE IF WASTE ACCUMULATES ON-SITE LESS THAN 90 DAYS

Section I - Waste Analysis

1. Facility has an adequate waste analysis plan. Yes ✓ No___

2. Facility provides adequate security. Yes ✓ No___

3. Facility has a sign with the legend "Danger - Unauthorized Personnel Keep Out". Yes ✓ No___ N/A___

Section J - General Inspection Requirements

1. Facility has an adequate written inspection schedule (and plan). Yes ✓ No___

2. Owner/operator maintains an inspection log. Yes ✓ No___

Section K - Requirements for Ignitable, Reactive or Incompatible Waste

1. Owner/operator is familiar with proper separation and safeguards needed to prevent ignition or reaction of ignitable or reactive waste. Yes ✓ No___

2. Owner has transferred waste from all containers leaking, bulging, or corroding. Yes ✓ No___

Section L - Manifest System, Recordkeeping and Reporting

1. Waste received from off-site complies with manifest requirements. Yes___ No___

2. Owner/operator maintains an adequate written operating record(s) at the facility. See comments Yes___ No ✓

3. Owner/operator maintains an adequate closure plan for all facilities. See comments Yes___ No ✓

4. Owner/operator maintains an adequate post-closure plan for disposal facilities. NA Yes___ No___

Section M - Financial Assurance

See comments

1. Owner/operator had financial assurance for the most recent closure and post-closure cost estimates for all facilities by July 6, 1982. Yes___ No ✓ N/A___

2. Owner/operator has liability coverage or preparations made for coverage of sudden accidental releases by July 15, 1982. Yes___ No ✓ N/A___

3. Owner/operator has non-sudden accidental occurrence for certain storage, treatment and disposal facilities due by Jan. 16, ________.
83, 84*, 85* Yes___ No ✓ N/A___

*Note: A letter of intent to Executive Director is required by January 16, 1983 stating date coverage will begin (unless coverage previously demonstrated).

CONTENTS

Facility Name H L+P Parish Generating Station Reg. # 31631

✓ 1. CM&E Code Sheet 0814

Letter

✓ 2. Contents Sheet (if included)

✓ 3. Major Group I Checklist or Non Major Checklist

RECEIVED
AUG 21 '84
ENFORCEMENT AND FIELD OPERATIONS

✓ 4. *Facility Checklists

___ A. Landfills

✓ B. Surface Impoundments

___ C. Land Treatment

✓ D. Tanks

___ E. Chemical, Physical, Biological Treatment

___ F. Waste Piles

___ G. Incinerators

___ H. Thermal Treatment

✓ 5. Closure and Post-Closure Compliance Review Checklist

___ 6. Ground Water Monitoring Program Checklist

✓ 7. Financial Assurance, Closure and Post Closure Worksheet

___ 8. Major Facilities Status Sheet (Not Required for Non Majors)

✓ 9. Generator/Facility/Transporter (GFT) Status (Not Required for Majors)

* If a Required Checklist is Omitted, Explain Below:

Checklist ____________
(attach to correct checklist)

Date ____________

Reg./Permit No. ________

INDUSTRIAL SOLID WASTE

Compliance Monitoring Inspection Report

COMMENTS SHEET

SECTION: B Paragraph: 2

Notification requirements - The facility has not updated its Part A application to reflect new waste streams and storage areas.

Paint waste - new waste stream

Underground sump (tank) - New storage facility

SECTION: L Paragraph: 2 - 3

Operating record - The information to be held in the operating record is located in 3 seperate areas of the plant. The paperwork needs to be consolidated into one file

Closure - No closure plans are maintained at the facility

SECTION: M Paragraph:

Financial assurance - No Financial assurance document have been submitted

INDUSTRIAL SOLID WASTE

Compliance Monitoring Inspection Report
~~Surface Impoundments Checklist (TAC 335.281-.288)~~ Class of Waste (II)

Open Dump inspection 7/83

***

1. Are surface impoundments presently used to treat or store waste? Yes ✓ No___

   a. If yes, inspect the impoundments.

**2. Does the impoundment appear to maintain at least 2 feet (60 cm) of freeboard? Yes___ No___

**3. Check for evidence of overtopping of the dike. Is the facility compliant? Yes___ No___

**4. Check for evidence of seepage. Is the facility compliant? Yes___ No___

5. Containment system for dyked or dammed impoundments (335.283)

   **a. Does the earthen dike have a protective cover (e.g. grass, shale, rock) to minimize wind and water erosion? Yes ✓ No___

6. What wastes are treated or stored in the impoundment? Coal Fly Ash
storm water, sludges from demin. basin

7. Are waste analyses and trial tests conducted on these wastes (chemical processing of a different hazardous waste or method only)? N/A ✓ Yes___ No___

   a. If not, does the owner/operator have written documented information on similar treatment of similar wastes? Yes___ No___

8. Is this information retained in the operating record? N/A___ Yes ✓ No___

9. Is the impoundment inspected daily to check freeboard level? Yes___ No___

10. Is the impoundment, dikes and vegetation surrounding the dike inspected weekly to detect leaks, deterioration or failures? Yes___ No___

*(Changed 9/10/82, response format realigned, other minor changes)
**See Note on Page 1
***This response column indicates noncompliance.

***

11. Does the impoundment have a liner? Yes ✓ No___

a. If Yes, what type? Clay

b. If Yes, does it have a leachate collection and removal system? Yes___ No ✓

**12. Is there evidence of ignitable or reactive wastes placed in the impoundment? Yes___ No ✓

a. If Yes, explain in comments sheet [review 335.118(a)];
or
b. If Yes, is the impoundment used solely for emergencies? Yes___ No___

**13. Is there evidence of incompatible wastes placed in the impoundment [if yes, review 335.118(b)]? Yes___ No ✓

14. Are monitor wells required for this site? (Refer to Rule 335.191-.195 - Ground Water Monitoring) Yes___ No ✓

a. Has owner/operator installed, operated and maintained a ground water monitoring system (unless waived) prior to 11/19/81? Yes___ No___

NOTE 1: Attach Ground Water Monitoring Report if answer to question 14 is yes.

15. Describe impoundment(s) site and indicate plat map, location(s) and designation(s). Also describe each impoundment's dimensions and capacity (acre-feet): coal run ~~off~~ pond

NOTE 2: If the answer is No for Nos. 5a, 7a, 8, 9, 10 and No. 14 after 11/19/81, explain in comments sheet.

*(Changed 9/10/82, response format realigned)
**See Note on Page 1
***See Note Page 3

INDUSTRIAL SOLID WASTE

Compliance Monitoring Inspection Report
Tanks Checklist (Rule 335.261-.267)

Section A - General ***

1. Are tanks presently used to treat or store waste? Yes ✓ No___

   a. If no, do not complete rest of form.

   b. If yes, check tanks. (Describe type of tank and indicate underground, above ground, or on-ground in comments sheet).

   c. Is there evidence that incompatible wastes have been placed in the tank? Yes___ No ✓

      (1) If yes, refer to 335.118(b) and explain in comments sheet.

   d. Check tank(s) for evidence of any ruptures, leaks or corrosion. Is facility compliant [335.264(a)(4)]? Yes___ No___

2. Are there any uncovered tanks? Yes___ No ✓

   a. If no, do not complete b. - e.

   b. If yes, do they have 2 feet (60 cm) freeboard? or N/A___ Yes___ No[1]___

   c. A containment structure? (e.g. dike or trench equal to volume of 2 feet of tank) or N/A___ Yes___ No[1]___

   d. A drainage control system? N/A___ Yes___ No[1]___

   e. A diversion structure? (e.g. standby tank) N/A___ Yes___ No[1]___
   NOTE 1: The structure in c, d or e must have a capacity that equals or exceeds the volume of the top 2 feet (60 cm) of the tank; any one yes answer for 2b, c, d or e indicates compliance.

3. Are any of the tanks continuous feed? Yes___ No ✓

   a. If yes, is it equipped with a means to stop inflow (e.g. waste feed cutoff or bypass to a stand-by tank)? Yes___ No___

Section B - Waste Analysis

1. Is the tank used to store one waste exclusively? Yes ✓ No___

   a. If no, what are the different wastes stored in the tank?

   Solvents
   Oil
   Paint thinner (used as a solvent)

TDWR-
Page 9 of 30 of Group II
*(Changed 9/10/82, added *** note and reworded some questions)
**Note checklist questions to be noted or completed during on-site inspection
***No checked in this column indicates noncompliance.

b. Are waste analyses and trial treatment or storage tests done on these different wastes? N/A ✓ Yes___ No*** ___
NOTE 1: Not applicable for less than 90 day storage [335.69(a)(2)].

(1) If no, does he have written, documented information on similar storage or treatment of similar wastes? N/A___ Yes___ No___

c. Are there records available of these wastes analyses in the operating record? N/A___ Yes ✓ No___

Section C - Inspections (Where Present) 335.264

1. Do the records indicate the owner/operator inspects, where present, the following at least daily:

NA

a. Discharge control equipment (e.g. waste feed cut-off, bypass and/or drainage system)? Yes___ No___

b. Monitoring equipment (e.g. pressure and temperature gages)? Yes___ No___

c. Level of waste in each uncovered tank? Yes___ No___

2. Do the records indicate the owner/operator inspects the following at least weekly:

a. Construction materials of tanks for corrosion or leaks? Yes___ No ✓
See Comments

b. Construction materials of and area surrounding discharge confinement structures for erosion or signs of leakage? Yes___ No ✓

3. Is there a written inspection schedule (Rule 335.116)? Yes ✓ No___

a. If yes, is the schedule kept at the site? Yes ✓ No___

b. If no for 3 or 3a, explain in the comments sheet.

4. Is there evidence of ignitable wastes placed in tanks? Yes ✓ No___

a. If yes, do records indicate that they are treated, rendered, or mixed before or immediately after placement in the tank so it no longer meets the definition of ignitable? or Yes___ No[2]___

** b. Is the waste protected from sources of ignition? Yes___ No[2]___

(1) If yes, use comments sheet to describe separation and confinement procedures.

(2) If no, use comments sheet to describe sources of ignition. or

*(Changed 9/10/82, added *** note and 2 notes added)
**See Note on Page 9
***See Note on Page 9

***

c. Is the tank used solely for emergencies? Yes___ No[2] ✓
NOTE 2: Only one of the three questions 4a, b, c answered yes indicates compliance.

5. Is there evidence of reactive wastes placed in tanks? Yes___ No ✓

   a. If yes, do records indicate that they are treated rendered, or mixed before or immediately after placement in the tank so it no longer meets the definition of reactive? or Yes___ No[1]___

   **b. Is the waste protected from sources of reaction? Yes___ No[1]___

      (1) If yes, use comments sheet to describe separation and confinement procedures.

      (2) If no, use comments sheet to describe sources of reaction. or

   c. Is the tank used solely for emergencies? Yes___ No[1]___
   NOTE 1: Only one of the three questions 5a, b, c answered yes indicates compliance.

6. Do the records indicate that incompatible wastes are placed in the same tank? Yes___ No ✓

   a. If yes, review 335.118(b) and explain in the comments sheet.

7. If a waste is to be placed in a tank that previously held an incompatible waste do operating records indicate that the tank was washed? NA Yes___ No___

   a. If yes, review 335.118(b) and describe washing procedures. ______________

   ____

   b. Describe how it is possible for incompatible waste to be placed in the same tank. ______________________________

   ____

   ____

NOTE: If the answer to Section A 2b-e and 3a, Section B 1b(1) and 1c, and Section C 1a-c, 2a, 2b, 3a, and 4a-c was no, explain in comments sheet.

8. Describe tank(s) site and indicate plat map location(s) and designation(s). Also describe size and capacity of each tank: Underground sump (dead end) (S-6) motor wash area

____

*(Changed 9/10/82)
**See Note on Page 9
***See Note on Page 9

Checklist ______________
(attach to correct checklist)

Date ______________

Reg./Permit No. __________

INDUSTRIAL SOLID WASTE

Compliance Monitoring Inspection Report

COMMENTS SHEET

SECTION: Tanks - inspection Paragraph: ______________

Inspections of this underground tank (Sump) are not conducted

SECTION: ______________ Paragraph: ______________

SECTION: ______________ Paragraph: ______________

INDUSTRIAL SOLID WASTE

*Closure and Post-Closure Compliance Review Checklist
(TAC Section 335.211-.220

**

Note: List each type of hazardous waste T, S, D facility, number and volume in the comments sheet.

I. CLOSURE PLAN; Is there a written plan? Yes___ No ✓

1. Does the plan identify the *MAXIMUM EXTENT OF OPERATION which will be unclosed during the life of the facility? Yes___ No___

*Note: The rules [335.213(a)(1)] require that the closure plans identify the maximum extent of the operation which will be unclosed during the life of the facility. If the plan is based on the expected extent of operations to be closed just prior to closure, it is important to consider whether that represents the "maximum" in this question.

2. Does the plan identify the steps for PARTIAL and/or COMPLETE CLOSURE [335.213(a)], at any time during the intended operating life, of

a. surface impoundments? N/A___ Yes___ No___

b. landfills? N/A___ Yes___ No___

c. tanks? N/A___ Yes___ No___

d. other (specify: ________________) Yes___ No___

3. Is there an estimate of the MAXIMUM INVENTORY of wastes in storage or treatment at any time during the life of the facility? N/A___ Yes___ No___

4. Does the plan clearly identify the STEPS TO CLOSE [335.213(a)]?

a. at any point during the intended operating life? Yes___ No___

b. at the end of the intended operating life? Yes___ No___

*(Changed 10/13/83, added question to I above; this checklist is for use with "Part A" permit applicants that have not submitted "Part B" application)
**This response column indicates noncompliance.

**

5. Are the following STEPS TO CLOSE included in the plan:

a. removal of wastes [335.214(a)]?	N/A___	Yes___	No___
b. treatment of wastes [335.214(a)]?	N/A___	Yes___	No___
c. waste disposal [335.214(a)]?	N/A___	Yes___	No___
d. cover [335.344(a)]?	N/A___	Yes___	No___
e. decontamination of equipment and structures [335.213(a)(3)]?	N/A___	Yes___	No___
f. closure certification [335.216]?	N/A___	Yes___	No___

6. Does the plan describe the DECONTAMINATION [335.213(a)(3)] of facility equipment and structures? N/A___ Yes___ No___

7. With respect to CERTIFICATION of closure (335.216), does the closure plan describe scheduled or estimated number of inspections? Yes___ No___

8. Does the plan identify the YEAR when closure is expected to occur [335.213(a)(4)]? Year ________ Yes___ No___

9. Is there a SCHEDULE for final closure activities [335.213(a)(4)]? Yes___ No___

10. Closure plan evaluated ___________ : Adequate Yes___ No___
(date)

COMMENTS

____

____

____

____

____

____

____

*(Changed 10/13/83, added checklist question No. 10)
**This response column indicates noncompliance.

*(Changed 10/13/83, added checklist for use with "Part A" permit applicants that have not submitted "Part B" application)
**This response column indicates noncompliance.

**

II. POST-CLOSURE PLAN CHECKLIST; Is there a written plan? *N/A ✓ Yes___ No___

*Note: If no post-closure required, proceed to Cost Estimate Checklist.

1. Does the post-closure plan provide for 30 years of post-closure care? N/A___ Yes___ No___

   - How many years of post-closure care? ______________

2. Does the plan clearly identify the ACTIVITIES required in the post-closure care? Yes___ No___

3. Do the MAINTENANCE PLANS for waste containment structures [335.218(a)(2)] include:

   a. maintaining final cover (erosion damage repair) frequencies [335.344(d)(1)]? Yes___ No___

   b. vegetation and fertilizing frequencies [335.218(a)(2)(A)]? Yes___ No___

   c. collecting, removing, and treating leachate activities [335.344(d)(2)]? N/A___ Yes___ No___

   d. collecting, removing, and treating leachate frequencies [335.344(d)(2)]? N/A___ Yes___ No___

   e. gas collection activities [335.344(d)(3)]? N/A___ Yes___ No___

   f. gas collection frequencies [335.344(d)(3)]? N/A___ Yes___ No___

4. Do MONITORING EQUIPMENT MAINTENANCE plans [335.218(a)(2)(B)] include:

   a. activities? Yes___ No___

   b. frequencies? Yes___ No___

5. Does the plan identify the name, address and phone number of the POST-CLOSURE PERIOD CONTACT [335.218(a)(3)]? Yes___ No___

*(Changed 10/13/82; added checklist for use with "Part A" permit applicants that have not submitted "Part B" application)
**This response column indicates noncompliance.

**

6. For landfills, does the post-closure plan address the following objectives and indicate how they will be achieved [335.344(b)]?

   a. Control of pollution migration via ground water, surface water, and air. N/A___ Yes___ No___

   b. Control of surface water infiltration, including prevention of pooling. N/A___ Yes___ No___

   c. Prevention of erosion. N/A___ Yes___ No___

7. For land treatment operations, does the post-closure plan address the following objectives and indicate how they will be achieved [335.327(a)]?

   a. Control of migration of hazardous wastes and constituents into the ground water. N/A___ Yes___ No___

   b. Control of the release of contaminated runoff into surface water. N/A___ Yes___ No___

   c. Control of the release of airborne particulate contaminants caused by wind erosion. N/A___ Yes___ No___

   d. Protection of food chain crops. N/A___ Yes___ No___

8. For landfills and land treatment operations, does the post-closure plan include at least a narrative statement indicating that the following factors were considered in addressing the closure objectives [335.327(b), 335.344(b)]?

   a. Type and amount of waste. N/A___ Yes___ No___

   b. Mobility and rate of migration. N/A___ Yes___ No___

   c. Site location, topography, and surrounding land use. N/A___ Yes___ No___

   d. Climate, including precipitation. N/A___ Yes___ No___

   e. Characteristics of the cover, including material, final surface contour, thickness, porosity, permeability, slope, vegetation. N/A___ Yes___ No___

*(Changed 9/30/82, added checklist for use with "Part A" permit applicants that have not submitted "Part B" application)
**This response column indicates noncompliance.

**

f. Geological and soil profiles and surface and subsurface hydrology. N/A___ Yes___ No___

g. Unsaturated zone monitoring. N/A___ Yes___ No___

h. Type, concentration, and depth of hazardous constituent migration as compared to background concentrations. N/A___ Yes___ No___

9. Does the plan address the requirement for notice to the local land authority (335.219)? Yes___ No___

10. Does the plan address the requirement for notice in the deed (335.220)? Yes___ No___

11. Post closure plan evaluated ________ : Adequate Yes___ No___
Date

COMMENTS

*(Changed 10/13/83; added checklist for use with "Part A" permit applicants that have not submitted "Part B" application)
**This response column indicates noncompliance.

III. COST ESTIMATE; Evaluated: ________ N/A___ Yes___ No___
date

1. Is there a written closure cost estimate [335.232(a)] (Supp. 14 of Group I for estimated cost? Yes___ No ✓

2. Is the closure cost estimate adequate to cover all required closure activities [335.232(a)]? Yes___ No___

   If "No", specify in comments.

3. Is there a written post-closure cost estimate [335.233(a)]? N/A ✓ Yes___ No___

4. Is the annual estimate multiplied by 30 to cover the entire post-closure care period [335.233(b)]? Yes___ No___

   or number of years _____

5. Is the cost estimate adequate to cover all the activities in the post-closure plan [335.218(a)]? Yes___ No___

   Including labor costs? Yes___ No___

   As well as the requirements of notice to local land authorities and in deeds (335.219 and .220)? Yes___ No___

COMMENTS

No closure plan maintained at the facility

No closure cost estimates maintained at the facility

*(Changed 10/13/83, added checklist for use with "Part A" permit applicants that have not submitted "Part B" application)

**This response column indicates noncompliance.

Ch list ____________
(attach to correct checklist)

Date ____________

Reg./Permit No. ____________

INDUSTRIAL SOLID WASTE

Compliance Monitoring Inspection Report

COMMENTS SHEET

SECTION: ____________ Paragraph: ____________

SECTION: ____________ Paragraph: ____________

SECTION: ____________ Paragraph: ____________

* 31631 HOUSTON LIGHTING & POWER CO. *

GENERAL INFORMATION:

HOUSTON LIGHTING & POWER CO.
W.A.PARISH GENERATING STATION
P O BOX 1700 - W.F.MCGUIRE
HOUSTON, TEXAS 77001

RECORD TYPE:	GENERATOR	CONTACT:	W F MCGUIRE
REPORT FREQUENCY:	A 06-81 P 12-80	PHONE:	713-228-9211
REGISTRATION DATE:	12-14-79	BASIN:	12 BRAZOS RIVER
LAST CHANGE DATE:	10-29-82	SEGMENT:	1202
EMPLOYEE GROUP:	100-249	DISTRICT:	07
STATUS:	ACTIVE	TDH REGION:	
EPA ID NUMBER:	TXD097311849	COUNTY:	079 FORT BEND
STAFF:	GNK	WCO:	
HAZ WASTE STATUS:	GENERATOR/TRANSPORTER/TSD FACILITY		
METHOD TRANSPORT:			

GENERATING SITE LOCATION: Y V JONES ROAD, THOMPSONS, TX

DESCRIPTION OF WASTE GENERATING ACTIVITIES:

SEQ	SIC CODE	DESCRIPTION OF INDUSTRIAL ACTIVITES
01	4911	ELECTRIC SERVICES

SOLID WASTE GENERATION SUMMARY:

SEQ	WCC	WASTE DESCRIPTION AND DISPOSITION	CLASS	FORM
001	110450	OILS, WASTE OFF-SITE/SECONDARY USE	INH	LIQUID (NON-WATER BASE)
002	240840	MISC. INORGANIC SLUDGES ON-SITE/OFF-SITE	II	SLUDGE (WATER BASE)
003	370510	CONSTRUCTION DEBRIS AND NON-COMBUSTIBLE WASTE ON-SITE	III	SOLID (PREDOMINANTLY INORGANIC)
004	270270	ASH, BOILER ON-SITE / SOLD FOR RECOVERY	II	SOLID (PREDOMINANTLY INORGANIC)
005	179430	PCB CONTAMINATED MATERIAL SOLD FOR RECOVERY	INH	SOLID (PREDOMINANTLY INORGANIC)
006	170750	ASBESTOS OFF-SITE	INH	SOLID (PREDOMINANTLY INORGANIC)
007	170300	BRICK, REFRACTORY (SPENT) OFF-SITE	INH	SOLID (PREDOMINANTLY INORGANIC)
008	910100	SOLVENTS, SPENT EPA NOS: D001 OFF-SITE/SECONDARY USE	IH	LIQUID (NON-WATER BASE)
009	910110	PAINT THINNER EPA NOS: F003 F005 OFF-SITE	IH	LIQUID (NON-WATER BASE)
010	902570	WASTEWATER,DEMINERALIZER ACID REGENERATION EPA NOS: D002 ON-SITE	IH	LIQUID (WATER BASE)
011	902560	WASTEWATER,DEMINERALIZER BASE REGENERATION EPA NOS: D002 ON-SITE	IH	LIQUID (WATER BASE)
012	241470	DEMINERALIZER REGENERANT SLUDGE ON-SITE/OFF-SITE	II	SLUDGE (WATER BASE)
013	903070	METAL CLEANING WASTE, INORGANIC EPA NOS: D002	IH	LIQUID (WATER BASE)

Addition - Paint waste

31631 HOUSTON LIGHTING & POWER CO. (CONT)
SOLID WASTE GENERATION SUMMARY (CONT):

SEQ	WCC	WASTE DESCRIPTION AND DISPOSITION	CLASS	FORM
		ON-SITE		
014	241210	SLUDGE CONTAINING INORGANICS ON-SITE/OFF-SITE	II	SLUDGE (WATER BASE)
015	218290	METAL CLEANING WASTE, ORGANIC OFF-SITE	II	LIQUID (NON-WATER BASE)
016	248990	SLUDGE CONTAINING ORGANICS ON-SITE/OFF-SITE	II	SLUDGE (WATER BASE)
017	210480	OILS, WASTE OFF-SITE/SECONDARY USE	II	LIQUID (NON-WATER BASE)
018	283230	OILY WASTE, MISCELLANEOUS OFF-SITE	II	SOLID (PREDOMINANTLY ORGANIC)
019	183230	OILY WASTE, MISCELLANEOUS OFF-SITE	INH	SOLID (PREDOMINANTLY [illegible]NIC)
020	172250	ASH, FLY, MIXED WITH SCRUBBER SLUDGE ON-SITE	INH	SOLID (PREDOMINANTLY INORGANIC)

HAZARDOUS WASTE DESCRIPTION		IGNIT	CORR	EP TOX	REACT	ACUTE	TOX
D001	IGNITABLE WASTE	X					
D002	CORROSIVE WASTE		X				
F003	SPENT NON-HALOGENATED SOLVENTS, XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SOLVENTS.	X					
F005	SPENT NON-HALOGENATED SOLVENTS, METHANOL, TOLUENE, METHYL ETHYL KETONE, METHYL ISOBUTYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SOLVENTS.	X					X

(HAZARD CODES)

SOLID WASTE MANAGEMENT FACILITIES SUMMARY:

SEQ DESCRIPTION AND STATUS

01 LAGOON/POND
ACTIVE
DISTRICT: 07
COUNTY: 079 FORT BEND
BASIN: 12 BRAZOS RIVER
SEGMENT: 1202

LATITUDE:
LONGITUDE:
SURFACE AREA:
DATE OPENED: 11-79
DATE INACTIVE:
DATE CLOSED:
SUBJECT TO PERMIT: NO
DEED REQUIRED: YES
CAPACITY:
ELEVATION:
DATE RECORDED:

FACILITY USE: STORAGE/PROCESSING/DISPOSAL
002 II MISC. INORGANIC SLUDGES
004 II ASH, BOILER
011 IH WASTEWATER, DEMINERALIZER BASE REGENERATION
012 II DEMINERALIZER REGENERANT SLUDGE
014 II SLUDGE CONTAINING INORGANICS
016 II SLUDGE CONTAINING ORGANICS
020 INH ASH, FLY, MIXED WITH SCRUBBER SLUDGE

FULL RECORD REPORT

31631 HOUSTON LIGHTING & POWER CO. (CONT)

SOLID WASTE MANAGEMENT FACILITIES SUMMARY (CONT):

SEQ DESCRIPTION AND STATUS

02 LANDFILL
ACTIVE
DISTRICT: 07
COUNTY: 079 FORT BEND
BASIN: 12 BRAZOS RIVER
SEGMENT: 1202

LATITUDE: CAPACITY:
LONGITUDE: ELEVATION:
SURFACE AREA:
DATE OPENED: 11-79
DATE INACTIVE:
DATE CLOSED:
SUBJECT TO PERMIT: NO
DEED REQUIRED: YES DATE RECORDED:

FACILITY USE: DISPOSAL
003 III CONSTRUCTION DEBRIS AND NON-COMBUSTIBLE WASTE

03 DRUM STORAGE AREA (ENCLOSED)
ACTIVE
DISTRICT: 07
COUNTY: 079 FORT BEND
BASIN: 12 BRAZOS RIVER
SEGMENT: 1202

LATITUDE: CAPACITY:
LONGITUDE: ELEVATION:
SURFACE AREA:
DATE OPENED: 04-80
DATE INACTIVE:
DATE CLOSED:
SUBJECT TO PERMIT: NO
DEED REQUIRED: NO DATE RECORDED:

FACILITY USE: STORAGE
005 INH PCB CONTAMINATED MATERIAL

04 BOILER (ENERGY-PRODUCING)
ACTIVE
DISTRICT: 07
COUNTY: 079 FORT BEND
BASIN: 12 BRAZOS RIVER
SEGMENT: 1202

LATITUDE: CAPACITY:
LONGITUDE: ELEVATION:
SURFACE AREA:
DATE OPENED:
DATE INACTIVE:
DATE CLOSED:
SUBJECT TO PERMIT: NO
DEED REQUIRED: NO DATE RECORDED:

FACILITY USE: PROCESSING/DISPOSAL
001 INH OILS, WASTE
008 IH SOLVENTS, SPENT
017 II OILS, WASTE

05 MISCELLANEOUS STORAGE CONTAINERS
ACTIVE
DISTRICT: 07
COUNTY: 079 FORT BEND
BASIN: 12 BRAZOS RIVER
SEGMENT: 1202

LATITUDE: CAPACITY:
LONGITUDE: ELEVATION:
SURFACE AREA:
DATE OPENED:
DATE INACTIVE:
DATE CLOSED:
SUBJECT TO PERMIT: NO
DEED REQUIRED: NO DATE RECORDED:

FACILITY USE: STORAGE
006 INH ASBESTOS
007 INH BRICK, REFRACTORY (SPENT)

Ole Tank - underground
wash down from large cleaning operations

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

August 16, 1984

Mr. W. F. McGuire
Houston Lighting and Power Company
P. O. Box 1700
Houston, TX 77001

CERTIFIED MAIL

Dear Mr. McGuire:

Re: Houston Lighting and Power Parish Generating Station, ISW Registration No. 31631

On July 27, 1984, Karen Droz Friebus conducted an industrial solid waste compliance inspection at the subject facility. The following deficiencies were noted and discussed during the inspection.

1. The permit application on file for the Parish facility has not been updated to reflect new waste streams and waste storage areas as required by Texas Administrative code (TAC) Section 335.6.
2. The Parish facility does not maintain a central operating record as required by TAC Section 335.173.
3. The Parish facility does not maintain a closure plan as required by TAC Section 335.213.
4. The Parish facility has not submitted any financial assurances for closure costs and liability coverage for sudden or non-sudden occurrences as required by TAC sections 335.7 and 335.232 which references section 264.142 of the Federal Register.
5. The Parish facility is presently operating an underground tank as a hazardous waste storage area. This type of storage area can not be inspected properly as required by TAC Section 335.264.

Please submit to this office in writing by September 7, 1984, your plans and schedule to correct the above deficiencies. If you have any questions, please call Karen Droz Friebus at 713-479-5981.

Sincerely,

Merton J Coloton

Merton J. Coloton, P.E.
Supervisor, District 7

MJC:KDF:ss

1836-1986

REPLY TO: DISTRICT 7 / 4301 CENTER STREET / DEER PARK, TEXAS 77536 / AREA CODE 713/479 5981

P. O. Box 13087 Capitol Station • Austin, Texas 78711 • Area Code 512/475-3187

Reference 18

RECORD OF COMMUNICATION Reference 18	xx Phone Call ☐ Conference	☐ Discussion ☐ Other (specify)	☐ Field Trip
	(Record Of Item Checked Above)		

TO:	FROM:	
Eddie Garcia Soil Conservation Tech. Soil Conservation Serv. 713-342-8582	Carol Cox FIT Env. Scientist EPA Region VI ICF Technology 214-744-1641	DATE: 3-2-90 TIME: 9:35 a.m.

SUBJECT: Information Concerning Farming, Soil Types and Water Use of Smithers Lake - Thompsons Area, Fort Bend Counties, Texas

SUMMARY OF COMMUNICATION:

Mr. Garcia indicated that due to the clay-ey nature of the soil, soils in the area would have a IIW or IIIW classification. Farming consists mainly of livestock ranching and isolated rice growing. Ground water is used for residential purposes, irrigation of rice crops and livestock watering. Smithers Lake belongs to the power plant and is used solely by them as a cooling pond. People occasionally fish in the lake off of bridges. Mr. Garcia could give no estimate as to the amount of fish caught.

Carol Cox

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted.

Reference 19

X-Tams

Houston Lighting & Power Company

P.O. Box 1700 Houston, Texas 77251 (713) 228-9211

MAR 8 1989

WASTEWATER PERMIT EXCEEDENCE NOTIFICATION

DATE: February 27, 1989	CORRESPONDENCE NO.:
TO: Mr. Myron O. Knudson, P.E. Water Management Division (6W) U.S. Environmental Protection Agency Region VI 1445 Ross Avenue Dallas, Texas 75202-2733	Mr. Allen P. Beinke, Jr. Executive Director Texas Water Commission P.O. Box 13087 Capitol Station Austin, Texas 78711
NPDES PERMIT NO.: TX0006394	TWC PERMIT NO.: 01038

FACILITY NAME: W. A. Parish Generating Station

EXCEEDENCE TYPE: MAXIMUM ______ MINIMUM ______ OVERFLOW X OTHER ______

EXCEEDENCE DATE: 2/4-2/8/89	OUTFALL NO. & DESCRIPTION: 006 - Auxiliary Cooling Tower Blowdown

PARAMETER:	PERMIT LIMIT:	SAMPLE RESULT:
NA	NA	NA

CAUSE OF EXCEEDENCE/ACTION TAKEN/CURRENT STATUS:

As a freeze protection measure during unusually cold weather conditions, an auxiliary cooling tower drain valve was left partially open allowing approximately 6000 gallons of auxiliary cooling water to be discharged to Smithers Lake. Plant personnel inadvertently did not collect a sample of the discharge, which was believed to be compliant with applicable permit parameters. No adverse impact to the receiving stream is anticipated as a result of this release.

SSD/plm/E_WAP2

1 - Permit/CD
2 - [illegible]
3 - [illegible]
4 - [illegible]
5 - [illegible]
6 - Correspondence
7 - CRAS
Date Filed
Clerk's Inits.

RECEIVED
MAR 03 1989
GW-EA

RESPONSIBLE OFFICIAL: (Name/Title)	SIGNATURE:	PHONE NO.:
EDWARD A. FEITH, DIVISION MANAGER ENVIRONMENTAL DEPARTMENT	Edward A. Feith	(713) 922-2205

T. Jones

Houston Lighting & Power Company

P.O. Box 1700 Houston, Texas 77251 (713) 228-9211

MAR 8 1989

WASTEWATER PERMIT EXCEEDENCE NOTIFICATION

DATE: February 28, 1989	CORRESPONDENCE NO.:
TO: Mr. Myron O. Knudson, P.E. Water Management Division (6W) U.S. Environmental Protection Agency Region VI 1445 Ross Avenue Dallas, Texas 75202-2733	Mr. Allen P. Beinke, Jr. Executive Director Texas Water Commission P.O. Box 13087 Capitol Station Austin, Texas 78711
NPDES PERMIT NO.: TX0006394	TWC PERMIT NO. 01038

FACILITY NAME: W. A. Parish Generating Station

EXCEEDENCE TYPE: MAXIMUM ____ MINIMUM ____ OVERFLOW X OTHER ____

EXCEEDENCE DATE: 02/23/89	OUTFALL NO. & DESCRIPTION: 005 - Drain Treatment System

PARAMETER: NA	PERMIT LIMIT: NA	SAMPLE RESULT: NA

CAUSE OF EXCEEDENCE/ACTION TAKEN/CURRENT STATUS:

Approximately 2900 gallons of wastewater overflowed a floor drain sump and ultimately entered Smithers Lake. The overflow occurred when plant personnel filled the sump with service water from a fire hydrant in order to operate the sump pumps and calibrate a flow meter. A sample of the discharge yielded a pH value of 8.23. Additional analytical data will be transmitted at a later date. No adverse impact to the receiving water body is anticipated.

SSD/plm:E_WAP3,P2

RESPONSIBLE OFFICIAL: (Name/Title) EDWARD A. FEITH, DIVISION MANAGER ENVIRONMENTAL DEPARTMENT	SIGNATURE: SSDowles for E.A. Feith	PHONE NO.: (713) 922-2205

2

(1) T.L.

Houston Lighting & Power Company

P.O. Box 1700 Houston, Texas 77251 (713) 228-9211

MAR 16 1989

WASTEWATER PERMIT EXCEEDENCE NOTIFICATION

DATE: March 6, 1989

CORRESPONDENCE NO.:

TO:

Mr. Myron O. Knudson, P.E.
Water Management Division (6W)
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas
75202-2733

Mr. Allen P. Beinke, Jr.
Executive Director
Texas Water Commission
P.O. Box 13087
Capitol Station
Austin, Texas 78711

NPDES PERMIT NO.: TX0006394

TWC PERMIT NO.: 01038

FACILITY NAME: W. A. Parish Generating Station

EXCEEDENCE TYPE:
MAXIMUM ____ MINIMUM ____ OVERFLOW X OTHER ____

EXCEEDENCE DATE: 2/27/89

OUTFALL NO. & DESCRIPTION: FGD Process Water

PARAMETER: NA

PERMIT LIMIT: NA

SAMPLE RESULT: NA

CAUSE OF EXCEEDENCE/ACTION TAKEN/CURRENT STATUS:

Approximately 360 gallons of flue gas desulfurization system process water entered plant yard drains and ultimately flowed into Smithers Lake. The process water escaped when an outlet damper failed. An existing containment sump was unable to contain the release due to outage of a service transfer pump. Plant personnel isolated the malfunctioning damper and the release was halted. A sample of the wastewater yielded a pH value of 7.96. No adverse impact to the receiving water body is anticipated. Additional analytical results will be transmitted at a later date.

SSD/plm/E_WAP4

RECEIVED

MAR 15 1989

6W-EA

____1 - Permit/CD
____2 - AO & AO ...
____3 - DMR's
____4 - Vio. Sum. Log
____5 - NCR
____6 - Correspondence
____7 - CRAS
____Date Filed
____Clerk's Inits.

RESPONSIBLE OFFICIAL: (Name/Title)

EDWARD A. FEITH, DIVISION MANAGER
ENVIRONMENTAL DEPARTMENT

SIGNATURE: Edward A. Feith

PHONE NO.: (713) 922-2205 3

O terry L

Houston Lighting & Power Company

P.O. Box 1700 Houston, Texas 77251 (713) 228-9211

MAR 24 1989

WASTEWATER PERMIT EXCEEDENCE NOTIFICATION

DATE: March 15, 1989

CORRESPONDENCE NO.:

RECEIVED
MAR 22 1989
6W-EA

TO:
Mr. Myron O. Knudson, P.E.
Water Management Division (6W)
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas
75202-2733

Mr. Allen P. Beinke, Jr.
Executive Director
Texas Water Commission
P.O. Box 13087
Capitol Station
Austin, Texas 78711

NPDES PERMIT NO.: TX0006394

TWC PERMIT NO.: 01038

FACILITY NAME: W. A. Parish Generating Station

EXCEEDENCE TYPE:
MAXIMUM ________ MINIMUM ________ OVERFLOW X OTHER ________

EXCEEDENCE DATE: 03/03/89

OUTFALL NO. & DESCRIPTION: Service water, cooling tower windage

PARAMETER: NA

PERMIT LIMIT: NA

SAMPLE RESULT: NA

CAUSE OF EXCEEDENCE/ACTION TAKEN/CURRENT STATUS:

Approximately 300 gallons of comingled service water and cooling tower windage overflowed a secondary collection sump and entered an un-named tributary of Dry Creek. The overflow occurred when a leak developed in a utility water line concurrently with an outage of a cooling tower windage collection sump pump. Both releases would have been contained; however, the secondary collection sump pump failed to operate and the sump overflowed. Plant personnel utilized a portable pump until the sump pump was repaired. A sample of the discharge yielded a pH value of 8.82. Additional analytical results will be transmitted at a later date. No adverse impact to the receiving stream is anticipated.

SSD/plm/E_WAP6

1 - Permit/CD
2 - AO & [illegible]
3 - DMP's
4 - [illegible] Sum. Log
5 - NCR
6 - Correspondence
7 - CRAS
Date Filed
Clerk's Initials

RESPONSIBLE OFFICIAL: (Name/Title)
EDWARD A. FEITH, DIVISION MANAGER
ENVIRONMENTAL DEPARTMENT

SIGNATURE: SSDavies for EAFeith

PHONE NO.: (713) 922-2205

Houston Lighting & Power Company

P.O. Box 1700 Houston, Texas 77251 (713) 228-9211

Terry

MAY 2 1989

WASTEWATER PERMIT EXCEEDENCE NOTIFICATION

DATE: 04/21/89	CORRESPONDENCE NO.:
TO: Mr. Myron O. Knudson, P.E. Water Management Division (6W) U.S. Environmental Protection Agency Region VI 1445 Ross Avenue Dallas, Texas 75202-2733	Mr. Allen P. Beinke, Jr. Executive Director Texas Water Commission P.O. Box 13087 Capitol Station Austin, Texas 78711
NPDES PERMIT NO.: TX0006394	TWC PERMIT NO.: 01038

RECEIVED
APR 28 1989
6W-EA

FACILITY NAME: W. A. Parish Electric Generating Station

EXCEEDENCE TYPE: MAXIMUM ____ MINIMUM ____ OVERFLOW X OTHER ____

EXCEEDENCE DATE:	OUTFALL NO. & DESCRIPTION:
04/17/89	Outfall 002 - Coal Pile Runoff

PARAMETER:	PERMIT LIMIT:	SAMPLE RESULT:
N/A	N/A	N/A

CAUSE OF EXCEEDENCE/ACTION TAKEN/CURRENT STATUS:

Approximately 15,000 gallons of wastewater overflowed a collection sump and entered an un-named tributary of Dry Creek. The overflow occurred when power to the sump pump was inadvertently interrupted in order to perform maintenance on plant electrical equipment. As soon as the overflow was discovered, power was restored to the pumps and the overflow halted. A sample of the discharge yielded a pH of 7.46. No adverse impact to the receiving stream is anticipated. Additional analytical results will be transmitted at a later date.

SSD:rmt

1 - Permit/CO
2 - AO & NO Rmkl
3 - DMR's
4 - Vio. Sum. Log
5 - RCR
6 - Correspondence
7 - CRAS
Date Filed
Clerk's Inits.

RESPONSIBLE OFFICIAL: (Name/Title)	SIGNATURE:	PHONE NO.:
EDWARD A. FEITH, DIVISION MANAGER ENVIRONMENTAL DEPARTMENT		(713) 922-2205

5

Reference 20

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

FORT BEND COUNTY, TEXAS AND CERTAIN POLITICAL DISTRICTS

COMMUNITY NAME	COMMUNITY NUMBER
(UNINCORPORATED AREAS)	480228

PANEL 245 OF 550

(SEE MAP INDEX FOR PANELS NOT PRINTED)

MAP PANEL NUMBER

480228 0245 B

EFFECTIVE DATE:

AUGUST 5, 1986

Federal Emergency Management Agency

PANEL 265 OF 550

PANEL 400 OF 550

PANEL 425 OF 550

Reference 21

RECORD OF COMMUNICATION Reference 21	xx Phone Call	Discussion	Field Trip
	Conference	Other (specify)	

(Record Of Item Checked Above)

TO:	FROM:	DATE / TIME
Henry Fleming Floodplain Management Coordinator; Corps of Engineers 409-766-3070	Carol Cox FIT Env. Scientist EPA Region VI ICF Technology 214-744-1641	DATE: 3-2-90 TIME: 1:40 p.m.

SUBJECT: Floodplain of Smithers Lake, Rabbs Bayou, Fort Bend County, Texas

SUMMARY OF COMMUNICATION:

Mr. Fleming indicated the land area, including the Houston Lighting and Power Generating Station, is Zone C on the floodplain. The land is high enough not to sustain flooding at any given time.

Carol Cox

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted.

Reference 22

RECORD OF COMMUNICATION Reference 22	[xx] Phone Call [ ] Discussion [ ] Field Trip [ ] Conference [ ] Other (specify) (Record Of Item Checked Above)

TO: Eddie Garcia Soil Conservation Tech. Soil Conservation Serv. 713-342-8582	FROM: Carol Cox FIT Env. Scientist EPA Region VI ICF Technology 214-744-1641	DATE: 3-2-90 TIME: 4:00 p.m.

SUBJECT: Use of Water From Rabbs Bayou, Erosion Control for Area, Smithers Lake, Thompsons

SUMMARY OF COMMUNICATION:

Rabbs Bayou is used primarily for drainage from the cities of Richnond and Rosenberg. The Fort Bend County Drainage District dug out the bayou approximately five years ago and seeded it with Bermuda grass. Rabbs Bayou holds little water and most farmers do not use it for livestock watering. Fencing is sometimes done to allow cattle access to the water. Very little soil erosion occurs in the area.

Carol Cox

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted.

Reference 23

RECORD OF COMMUNICATION Reference 23	xx Phone Call Conference	Discussion Other (specify)	Field Trip

(Record Of Item Checked Above)

TO:	FROM:	DATE / TIME
Hilda Montecinos Senior Secretary W.A. Parish Generating Station 713-343-0561	Carol Cox FIT Env. Scientist EPA Region VI ICF Technology 214-744-1641	DATE: 3-7-90 TIME: 1:40 p.m.

SUBJECT: Employee Count for W.A. Parish Generating Station

SUMMARY OF COMMUNICATION:

The W.A. Parish employs 96 persons in their gas-fired production area and 543 persons in their coal-fired production area. The total employee count is 639.

Carol Cox

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted.

Reference 24

1 - Permit/CD
BG 2 - AO & AO matl (copy)
3 - DMR's
4 - Vio. Sum. Log
5 - NCR
6 - Correspondence
7 - CRAS
11-14-86 Date Filed
dlL Clerk's Inits.

OTHER OFFICES
WASHINGTON, D.C.
DALLAS
AUSTIN

BAKER & BOTTS

ONE SHELL PLAZA
910 LOUISIANA
HOUSTON, TEXAS 77002-4995

TELEPHONE: (713) 229-1234
TELECOPIER: (713) 229-1730
TELEX: 76-2779

G-23,673

March 3, 1986

Paul Whitley (6W-EA)
U.S. Environmental Protection
Agency - Region VI
1201 Elm Street
Dallas, Texas 75270

RE: Administrative Order Docket No. VI-86-020, NPDES Permit No. TX0006394, In the Matter of Houston Lighting & Power Company

Dear Mr. Whitley:

Enclosed for filing please find the original and one copy of our Answer to Findings of Violation and Administrative Order of January 28, 1986. By copy of this correspondence, we are serving Rex McDonnell at the Texas Water Commission and Robert L. Deese of EPA with a copy of the same.

Very truly yours,

BAKER & BOTTS

BY [signature]
ROBERT E. MORSE, III

REM:175

Enclosures

cc: Mr. Robert L. Deese
U.S. Environmental Protection
Agency - Region VI
1201 Elm Street
Dallas, Texas 75270

RECEIVED
MAR 03 1986
6W-EA

cc: Mr. Rex McDonnell
Texas Water Commission
P. O. Box 13087
Capitol Station
Austin, Texas 78711

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6

IN THE MATTER OF HOUSTON LIGHTING & POWER COMPANY PROCEEDINGS UNDER SECTION 309(a)(3) and (a)(4), CLEAN WATER ACT, [33 U.S.C. 1319(a)(3) and (a)(4)], in RE: NPDES PERMIT NO. TX0006394	§ § § § § § § § § § §	DOCKET NO. VI-86-020 ANSWER TO FINDINGS OF VIOLATION AND ADMINISTRATIVE ORDER OF JANUARY 28, 1986

I.

Houston Lighting & Power Company (the "Company") received the captioned Administrative Order on January 31, 1986, which is the effective date of such Order.

II.

Before responding to the instructions on pages 6 and 7 of the Order, the Company respectfully wishes to respond to the alleged violations contained in Paragraph IV thereof, including reference to the past history of the Company's extensive compliance efforts to control and reduce overflows at the W. A. Parish Generating Station. Initially, we would refer Region VI to the Company's August 12, 1983 and September 9, 1983 responses to Administrative Order No. VI-83-153 and to the July 16, 1985 letter of Jack V. Ferguson to W. F. McGuire closing that administrative order based on the Company's compliance. Second, we would refer Region

VI to each of the notices of treatment system overflow submitted in connection with the alleged bypasses, wherein previous corrective actions are described in detail. We would note in passing that most of the alleged "bypasses" did not constitute "intentional diversions of waste streams from any portion of a treatment facility" (see permit definition of the term "bypass"), but rather constituted mechanical breakdowns which would be more appropriately classified as "upsets" within the meaning of the NPDES permit.

In reviewing the alleged "bypasses," we have determined that they can be categorized according to the four separate plant areas where they originated, i.e., (1) the floor and yard drain collection areas for Units 1-4, (2) the stormwater collection system for Units 5 and 6, (3) the stormwater collection system north of Unit 7 and (4) the cooling tower pretreatment system. For each of these four areas, we will next discuss the apparent cause of the alleged violations and the actions taken to minimize or alleviate the recurrence of each discovered condition.

1. Floor Drainage Wastewater from Units 1-4

Two of the alleged violations (March 19, 1985 and May 16, 1985) concern floor drainage wastewater which overflowed a collection sump, entering the stormwater drainage system to Smithers Lake (a privately owned cooling lake), when mechanical and electrical problems resulted in the failure of both the main and backup sump pumps which would normally pump floor drainage wastewater to the low volume treatment system.

The March 19, 1985 bypass occurred when the discharge valve for both pumps failed requiring the operator to turn the sump off until the needed repairs were completed. During this maintenance period, floor drainage wastewater entered the sump, resulting in an unintentional overflow. These valves are now being routinely inspected to insure proper operation. The May 16, 1985 malfunction was the result of a short circuit which interrupted the electrical supply to both pumps. Both the March 19, 1985 and May 16, 1985 incidents were exceptional and were corrected in an expeditious manner.

The sump collection system in question is used throughout the W. A. Parish Generating Station and has generally proven to be effective and reliable. We therefore do not feel that any further corrective action is necessary in this area.

2. <u>Stormwater Collection System for Units 5 and 6</u>

Fifteen of the alleged violations (June 12, June 13, July 6, July 10, August 7, August 9, August 12, August

13, August 14, August 19, September 16, September 21, October 1, October 14 and October 19, 1985) involved overflows to Smithers Lake via the stormwater drainage system for Units 5 and 6 (see Attachment A). These alleged bypasses included overflows of collection sumps for demineralizer regeneration wastewater and sanitary sewage. One spill occurred when a temporary line being used during a precipitator wash unexpectedly disconnected. Additionally, a spill occurred when a drain line associated with the coal handling facilities became plugged. Spills from the bottom ash system from ruptured transport lines and hopper maintenance were also captured in the Unit 5 and 6 stormwater system.

The September 16, 1985 demineralizer regeneration wastewater sump overflow occurred when a restricted diameter transfer line caused back pressure which reduced the capacity of the transfer pumps used to pump water to the low volume treatment basins. The restricted transfer line is scheduled to be replaced by April 15, 1986. The October 1, 1985 overflow occurred when a lift station pump went out of service and the remaining backup pump could not keep up with the final rinse of a cation bed regeneration. Although the malfunctioning pump has been repaired, larger capacity pumps and motors have been purchased for this sump. It is anticipated that these new pumps and motors, with their additional operating capacity, will be installed by April 1, 1986.

The July 6 and July 10, 1985 overflows of demineralizer wastewater occurred as a result of a broken valve indicator at the wastewater holding basins. The indicators showed the value to be open when in fact it was closed. The closed valve did not allow the demineralizer transfer sump to pump to the basins resulting in sump overflow. The defective valve has since been replaced.

The September 21, 1985 sewage treatment lift station overflow was unique in that one pump was disabled due to electrical problems, and the backup pump failed to operate due to a malfunctioning float switch. Although additional float switch devices are being tested, we do not feel that any modifications are necessary to the sewage collection system, which has generally proven to be effective and reliable.

The October 19, 1985 precipitator wash overflow occurred when a hose disconnected from a temporary pump used to transfer precipitator washwater to a lift station. This malfunction was repaired soon after it was discovered, and we do not expect this problem to occur again.

The August 14, 1985 coal washdown overflow occurred as a result of a plugged drain line causing excess water to back up in the tripper deck and eventually overflow to storm drains below the tripper deck. Once it was discovered, the line was cleaned and placed back into service.

The remaining alleged bypasses in the Unit 5 and 6 area involved bottom ash spills, which occurred due to plugged or ruptured pipes and hopper maintenance conducted to remove pluggages within the hopper. Due to the nature of its use, bottom ash transport pipe is subject to considerable abrasion and will weaken rapidly. This wear on the pipes has led to many of the pipe ruptures. Although much of the pipe has been routinely replaced, including all the Unit 5 pipe, those remaining sections of old pipe will be replaced during the next Unit 6 maintenance annual which will be completed by May 9, 1986. Additionally, the new pipe will be inspected periodically and either rotated or replaced if excessive wear is evident. Elbow joints which cannot be rotated will be replaced if considerable wear is discovered. Also, curbing is now in place on both Units 5 and 6 to redirect excess water during hopper maintenance to appropriate treatment facilities.

Although a considerable amount of effort has been expended to eliminate overflows in the Unit 5 and 6 area, the Company has recently implemented an "end-of-pipe" containment project to capture future spills which enter the stormwater drainage system for Units 5 and 6. All Unit 5 and 6 overflows cited in the Order entered Smithers Lake via a common storm drainage pipe. The proposed "end-of-pipe" containment project includes the construction of two transfer sumps to divert dry weather flows from the two stormwater catch basins to the wastewater treatment system. Thus, process water leakage that is not captured upstream should be routed to treatment facilities. Attached as Attachment C is a copy of the Engineering Design Plan for this project as well as an additional project discussed later in this answer. Also attached is a critical path schedule as required in the Administrative Order. Again, it is believed that this additional project will capture those spills in this area which escape existing primary and secondary containment structures.

3. <u>Stormwater Collection System North of Unit 7</u>

Five of the alleged bypasses (March 20, May 5, June 1, June 19 and July 11, 1985) involved overflows into the stormwater collection system north of Unit 7 and south of Unit 6 (see Attachment B). These incidents included overflows of the auxiliary cooling tower basins for Unit 7, spills of the bottom ash transport system for Unit 7 and 8 and a spill of air preheater washwater.

The March 20, 1985 auxiliary cooling tower overflow was attributed to a fan being out of service during a heavy rainfall event. The fan problem was corrected and is not expected to recur.

The May 5 air preheater washwater spill occurred as a result of damage to a transfer line during ongoing construction activities. Once the spill was discovered, the air preheater wash was discontinued until the damaged pipe could be repaired. We feel that the spill was a unique incident and is unlikely to recur.

Three bottom ash spills (June 1, June 19 and July 11, 1985) occurred due to operator errors during hopper maintenance and use of dewatering equipment and due to inadequate ash dewatering, resulting in leaks from ash disposal trucks leaving the containment area under the dewatering bins. Proper operating procedures have been reviewed with the operators. Containment projects in the Unit 7 and 8 area have previously been constructed and have largely been successful in the past.

As described in the previous section on Units 5 and 6 and as set forth in Attachment C, the Company is pursuing additional "end-of-pipe" controls for the Unit 7

10

area. This will allow for the redirection of any dry weather flows to the low volume wastewater treatment system and thereby provide additional backup to the previously constructed containment structures.

4. Cooling Tower Pretreatment System

The cooling tower pretreatment system provides softened and clarified make-up water to the condenser cooling water system. Four overflows (January 22, February 5, February 10 and March 30-April 1, 1985) were cited in the Order, all of which resulted in wastewater entering the stormwater drainage system and ultimately Smithers Lake. The first overflow was the result of faulty sump agitation line positioning which allowed sludge to accumulate around the pump suction and reduce its pumping capacity. As soon as the problem was discovered, blowdown to the sump was discontinued, and the sump agitation lines were repositioned to dislodge the sludge around the pumps. Inspection of the sump agitation system will be done periodically to insure that this problem does not recur.

The next two overflows were caused by a faulty blowdown valve which allowed blowdown to leak into a sump. The blowdown valve has been repaired and has been operating properly for over a year. This valve is also now inspected periodically, and we do not expect any more problems of this type.

The March 30-April 1, 1985 spill occurred due to the rupture of an inlet water pipe delivering lake water to the pretreatment system. This rupture occurred several days before a scheduled outage for annual maintenance. The ruptured make-up line prevented proper neutralization of lime softened water which normally occurs through acid injection and turbulent mixing in the transfer piping of this system to the main cooling towers. However, with inlet water unavailable due to the rupture, the wastewater could not be neutralized before draining the tank in order to perform annual maintenance. A procedure for manually transferring the high pH water from the clarifier to the transfer line with portable pumps has since been developed. From this line, the water can be routed to either the Unit 7 or Unit 8 main cooling tower basin where an existing acid injection system can be utilized to neutralize the water prior to ultimate discharge via Outfall 701 to Smithers Lake. We therefore do not believe this incident will be repeated.

III.

As described above, the Company believes that it has taken a good engineering approach to the overflow problems identified in the Order. Most problems were corrected immediately upon discovery. Backup pumps and containment structures were already in place. Increased inspection/maintenance activities have been scheduled. Installation of increased displacement pumps and motors, where appropriate, is in progress. In addition, the Company is pursuing the construction of an "end-of-pipe" capture system in the stormwater drainage lines that will provide additional insurance against future overflows. As requested, a critical path schedule is provided for this project. We believe that the foregoing efforts will be effective and will result in general compliance in the identified problem areas.

Respectfully submitted,

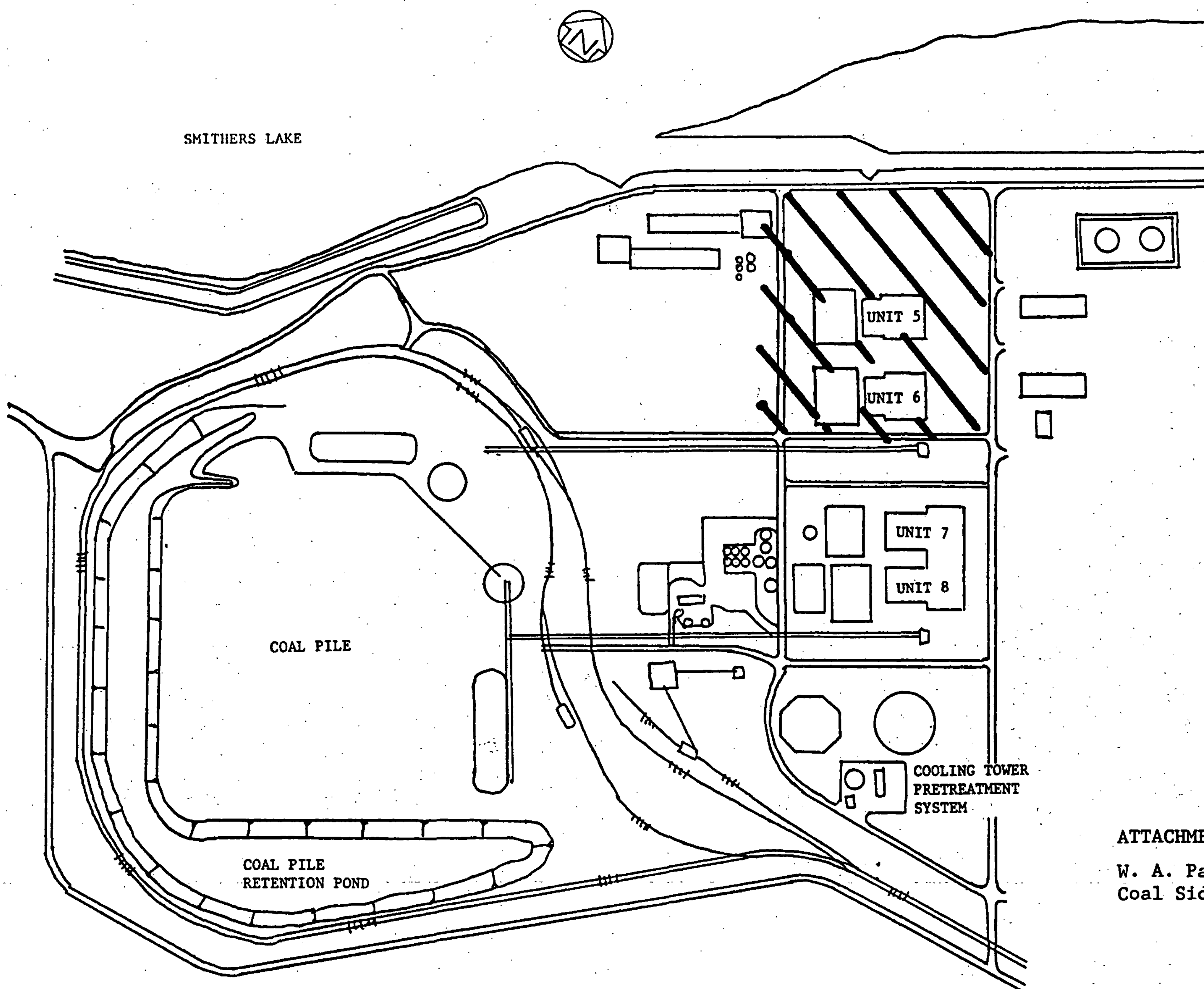
BAKER & BOTTS

DATED: March 3, 1986

BY ______________________

ROBERT E. MORSE, ~~III~~
3000 One Shell Plaza
Houston, Texas 77002
(713) 229-1492
Attorneys for Houston
Lighting & Power Company

001REMNP/118E01



ATTACHMENT A

W. A. Parish
Coal Side Plant Area

Reference 25

RECORD OF COMMUNICATION Reference 25	xx Phone Call	Discussion	Field Trip
	Conference	Other (specify)	

(Record Of Item Checked Above)

TO: Brad Cross Wellhead Protection Program, Texas Water Commission 512-371-6319	FROM: Carol Cox FIT Env. Scientist EPA Region VI ICF Technology 214-744-1641	DATE: 4-6-90 TIME: 2:45 p.m.

SUBJECT: Wellhead Protection For Southern Fort Bend County, Texas

SUMMARY OF COMMUNICATION:

No well heads south of Myer Intermediate School, Highway 365 south of Rosenburg are protected under the Texas Wellhead Protection Program. The school lies approximately ten miles northwest of Thompsons, Texas.

Carol Cox

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted.

Reference 26

Standard & Poor's Register

of Corporations, Directors and Executives

1993

Corporations

Volume 1

of 3 volumes

*Also DIRECTORS —Other Directors Are:
G. T. Graham — R. K. Davidson
D. E. Mader — W. M. Gibbons
R. L. Buchanan — D. F. Dammann
BUSINESS: Rail transp. serv.
S.I.C. 4011

HOUSTON BIOMEDICAL INC.
1440 Lake Front Circle, Woodland, Texas 77380
Tel. 713-363-0300
*Pres—John O. Behnke
V-P—John Z. Ramsey
*Treas—Harley Ballenger
Stock Exchange(s): OTC
*Also DIRECTORS —Other Directors Are:
Daniel L. Mark
PRODUCTS: Biomedical products
S.I.C. 2836

HOUSTON BLOW PIPE & STEEL PLATE WORKS
P.O. Box 1692, Houston, Texas 77251
Tel. 713-675-2273
*Pres, Adv Mgr, Per & Pub Rel Dir—William A. Redding
V-P (Prod)—Ernest A. Redding
*Treas—Goldie Redding (Mrs.)
*Compt—Patricia Langer (Mrs.)
Sales Mgr, Purch Agt & Chief Engr—Jerry J. Tilson
Accts— Shepherd & Stagg, Alvin, Texas
Primary Bank— Lockwood National Bank of Houston
Primary Law Firm—Dickerson, Early, Pennock & Carmouche
Sales: $2.83Mil Employees: 45
*Also DIRECTORS
PRODUCTS: Heavy alloy & carbon steel plate fabrication
S.I.C. 3443; 3449; 3498; 3499

HOUSTON CHRONICLE PUBLISHING CO.
(Div. Hearst Corporation)
801 Texas Ave., Houston, Texas 77002
Tel. 713-220-7171
*Pres & Publ—Richard J. V. Johnson
*V-P (Sales & Mktg)—John W. Sweeney
*V-P & Gen Mgr—G. E. McDavid
V-P (Oper)—Jack H. Stanley
V-P & Editor—Jack D. Loftis
Treas—Ray W. Youngblood
Research Mgr—Lynne Cook
Oper & Tech Serv Dir—D. E. Nissen
Cir Dir—John B. Laird
Mktg Dir—Robert Thomas
Adv Dir—Dwight M. Brown
Mgn Editor—Tony Pederson
Accts— Deloitte & Touche, Houston, Texas
Primary Bank— Texas Commerce Bank-Houston, N.A.
Primary Law Firm—Bracewell & Patterson
Employees: 1,900
*Also DIRECTORS
BUSINESS: Publishing newspapers
S.I.C. 2711

HOUSTON DIE CASTING CO.
(Subs. Chemilite Corp.)
3315 W. 11th Street, Houston, Texas 77008
Tel. 713-869-1434
*Pres—Harold L. Gluckman
Exec V-P (Product & Sales)—Joe Richard
*Secy & Compt—Peggy Papageorgiou
Purch Agt—Keith Humber
Accts— P. Levin & Co., Houston, Texas
Primary Bank— Ameriway Bank/Woodway, N.A.
Primary Law Firm—Weycer, Kaplan, Pulaski & Zuber
Sales: $3Mil Employees: 45
*Also DIRECTORS
PRODUCTS: Die castings & machining
S.I.C. 3599; 3363; 3364; 3541

HOUSTON ELECTRIC CO.
201 Redmond, Warner Robins, Ga. 31093
Tel. 912-922-8813
Pres—Charles G. McDonald
Secy & Treas—Mary C. McDonald
Gen Coun—R. Joneal Lee
Project Mgr—William H. Bernard
Accts— Homer Childs, Warner Robins, Ga.
Primary Bank— First National Bank of Atlanta
Sales: $1.30Mil Employees: 23
BUSINESS: Electrical contracting
S.I.C. 5063; 5065

HOUSTON ELECTRONICS CORP.
(Div. Oak Crystal)
501 Pine St. Ext., Kane, Pa. 16735
Tel. 814-837-9550
Pres—John M. Launtz
V-P—Jack E. Launtz
Purch Agt—R. Iwansky
Sales Range: $2—5Mil Employees: 150
PRODUCTS: Quartz crystal bases, glass to metal seals
S.I.C. 3679

HOUSTON ENGINEERS, INC.
(Subs. Wilson Industries, Inc.)
P. O. Box 567, Houston, Texas 77001
Tel. 713-237-3050
*Pres—Dwight E. Beach, Jr.
*V-P (Engr)—Derrel D. Webb
V-P (Mfg)—O. Hunter
V-P (Mktg)—Bill Roberts
V-P (Fin) & Treas—J. P. Doyle
Secy—Humberto Kuhn
Cont—Colin Kinder
Accts— Arthur Andersen & Co., Houston, Texas
Primary Bank— Texas Commerce Bank-Houston, N.A.
Sales: $12Mil Employees: 140

*Also DIRECTORS —Other Directors Are:
Edwin A. Anderson — James K. Andrews
W. J. Miller — Preston Moore
Wallace S. Wilson
PRODUCTS: Oil well tools
S.I.C. 3533

H.W. HOUSTON CONSTRUCTION CO.
210 S. Victoria, Pueblo, Colo. 81003
Tel. 719-544-2791
Pres & Treas—Albert Concialdi
V-P & Secy—Kenneth W. West
V-P—Robert Concialdi
Gen Coun—Mickey W. Smith
Accts— C.L. Brown & Associates, Pueblo, Colo.
Primary Bank— Minnequa Bank of Pueblo
Primary Law Firm—Smith & Billups
Sales: $15Mil Employees: 100
BUSINESS: General contractor
S.I.C. 1542

HOUSTON INDUSTRIES INCORPORATED
P.O. Box 4567, Houston, Texas 77210
Tel. 713-629-3000

Houston Industries Incorporated

*Pres & Chief Exec Officer—D. D. Jordan
*Exec V-P & Chief Fin Officer—H. R. Dean
V-P & Treas—W. A. Cropper
V-P (Cor Devel)—R. B. Dyer
V-P, Gen Coun & Cor Secy—H. R. Kelly
V-P & Compt—D. M. McClanahan
*V-P—D. D. Sykora
Accts— Deloitte & Touche, Houston, Texas
Primary Bank— Chemical Bank, N.A.
Primary Law Firm—Baker & Botts
Revenue: $3.65Bil Employees: 11,599
Stock Exchange(s): NYS, BST, PAC, MID, CIN, PSE
*Also DIRECTORS —Other Directors Are:
Charles E. Bishop — John T. Cater
Floyd L. Culler, Jr. — Joseph M. Hendrie
Howard W. Horne — James R. Lesch
Jon S. Lindsay — Thomas B. McDade
Randall Meyer — Kenneth L. Schnitzer, Sr.
Jack T. Trotter
BUSINESS: Holding co.: generation, transmission, distr. & sale of electric energy, oil & gas; coal supply serv., cable TV; development & marketing of lighting, purchase of accounts receivable of subsidiary & venture capital
S.I.C. 6719; 1221; 1311; 4911; 5063; 6799

HOUSTON INSTRUMENT
(Div. Ametek Inc.)
8500 Cameron Rd., Austin, Texas 78753
Tel. 512-835-0900
Pres—Doyle K. Cavin
V-P (Mktg)—John J. Carr, Jr.
V-P (Mfg)—Vern Glover
V-P (Engr)—Ralph Lake
V-P (Admin)—Robert Zuzack
Compt—Ted Middelberg
Accts— Ernst & Young, Philadelphia, Pa.
Primary Bank— Chase Manhattan Bank, N.A.
Primary Law Firm—Stroock & Stroock & Lavan
Employees: 400
PRODUCTS: Computer graphic peripheral devices; plotters, digitizers, scanners
S.I.C. 3577; 3575; 3577

HOUSTON LIGHTING & POWER COMPANY
(Subs. Houston Industries Incorporated)
P.O. Box 1700, Houston, Texas 77251
Tel. 713-228-9211

SERVICE FIRST The Light company
Houston Lighting & Power

*Chrm & Chief Exec Officer—D. D. Jordon
*Pres & Chief Oper Officer—D. D. Sykora
Group V-P (Nuclear)—J. H. Goldberg
Group V-P (External Affairs)—R. J. Snokhous
Group V-P (Power Oper)—D. E. Simmons
Group V-P (Admin & Support)—E. A. Turner
Sr V-P, Gen Coun & Secy—H. R. Kelly
V-P (Energy Prod)—D. G. Tees
V-P (Human & Inf Resources)—R. E. Doan
V-P (Regulatory Rel)—R. S. Letbetter
V-P (Cust Rel)—A. D. Maddox
V-P & Compt—J. S. Brian
V-P (Fossil Fuel Resources)—L. G. Brackeen
V-P (Nuclear Oper)—Gerald E. Vaughn
Treas—K. W. Nabors
Accts— Deloitte & Touche, Houston, Texas
Primary Bank— Texas Commerce Bank, N. A.

Primary Law Firm—Baker & Botts
Revenue: $3Bil Employees: 10,400
*Also DIRECTORS —Other D
Charles E. Bishop — John T. C
Hollis R. Dean — Joseph M
Howard W. Horne — James R
Thomas B. McDade — Kenneth
Jack T. Trotter
PRODUCTS: Generation, transmissio electric energy
S.I.C. 4911

HOUSTON OIL & MI CORPORATION
(Subs. Seagull Energy
1100 Louisiana St., Houston,
Tel. 713-757-2131
*Chrm & Pres—Philip Oxley
*Exec V-P—Stephen D. Chesbro
*Sr V-P—G. W. Frank
*V-P—G. E. Burgher, Jr.
V-P—John L. Elliott
V-P & Asst Secy—C. B. Masters
*V-P—E. J. Milan
V-P—Vernon M. Turner
Treas—Gerald L. George
Secy—Karl A. Stew
Cont—T. S. Corbett

SUBSIDIARIES

HOUSTON OIL INTERNATI (SUBS.)
Chrm & Pres—Philip Oxley

HOUSTON OIL & MINERAL COMPANY (SUBS
Chrm & Pres—S. D. Chesebro

HOUSTON OIL & MINERALS COMPANY
Chrm—Joe B. Foster
Pres & Chief Exec Officer—Frederi

HOUSTON OIL & MINERALS DEVELOPMENTS, INC.
Chrm & Pres—S. D. Chesebro

HOUSTON PRODUCTION COM
Chrm & Pres—S. D. Chesebro

HOUSTON ROYALTY COMP
Chrm & Pres—S. D. Chesebro
Accts— Arthur Andersen & Co., Ho
Primary Bank— Continental Bank, N
Total Income: $184.72Mil Employ
*Also DIRECTORS —Other D
J. D. Gooch
BUSINESS: Oil, gas & minerals
S.I.C. 1311; 1382; 6792

HOUSTON OIL ROYALT
1301 Fannin St., Houston, T
Tel. 713-658-714
V-P & Tr Officer—Roark Ashie
Accts— KPMG Peat Marwick, Hou
Primary Bank— First City Nationa
Primary Law Firm—Vinson & Elki
Sales: $6.69Mil
Stock Exchange(s): NYS, BST, MID
BUSINESS: Oil & gas (natural gas)
S.I.C. 1311; 1321

HOUSTON OIL TI
1100 Louisianna St., Houston
Tel. 713-652-654
Sr V-P (Adm)—George Hamilton
Accts— KPMG Peat Marwick, Hou
Primary Bank— NCNB Texas Nat
Sales: $5.60Mil
Stock Exchange(s): ASE, BST
BUSINESS: Trust co. (oil)
S.I.C. 6792

HOUSTON PIPE LI
(Subs. Enron Co
1400 Smith St., Houston,
Tel. 713-454-616
*Chrm & Chief Exec Officer—R. O
Pres & Chief Oper Officer—Willi
Exec V-P (Fin)—Jack I. Tompkins
Sr V-P—J. G. Barnhart
Sr V-P (Energy Resources)—Rob
*Sr V-P (Law) & Asst Secy—Gary
V-P (Legislative & Regulatory Af
V-P (Gas Supply)—Jeff C. Buic
V-P (Engr, Constr, Right-of-Way
V-P & Treas—Rodney L. Gray
V-P (Fin)—D. H. Gullouist
V-P (Tax)—Robert J. Hermann
V-P (Product Plan)—Jerry Lee
V-P (Gas Supply)—Fred D. LaG
V-P (Mktg)—R. Nelson McCord
V-P & Secy—Peggy B. Menchaca
V-P & Cont—E. G. Parks
V-P (Transp & Mktg)—Robert C
V-P & Gen Coun—Thomas L. Sh
V-P (Gas Sales)—Richard L. Sto
Employees: 2,900
*Also DIRECTORS —Oth
Richard D. Kinder
BUSINESS: Natural gas transmi
S.I.C. 4922

Reference 27

P[illegible]int or type in the unshaded areas only
([illegible] areas are spaced for elite type, i.e., 12 c[illegible]rs/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. [illegible]VIRONMENTAL PROTECTION AGENCY
HAZARDOUS WASTE PERMIT APPLICATION
Consolidated Permits Program
(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

S												T/A
F	T	X	D	0	9	7	3	1	1	8	4	9	3

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS
A	801119	

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility' EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

[X] 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

C	YR.	MO.	DAY
8	58	06	01

FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

[ ] 2. NEW FACILITY *(Complete item below.)*

YR.	MO.	DAY

FOR NEW FACILITI[ES] PROVIDE THE DATE *(yr., mo., & day)* OPE[RA]TION BEGAN OR IS EXPECTED TO BEG[IN]

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

[ ] 1. FACILITY HAS INTERIM STATUS

[ ] 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code*(s)* in the space provided. If a process will be used that is not included in the list of codes below, the[n] describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY – For each code entered in column A enter the capacity of the process.
1. AMOUNT – Enter the amount.
2. UNIT OF MEASURE – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below)*: A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

C	DUP	T/A	C
C	DUP		1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
~~X-1~~	~~S02~~	~~600~~	~~G~~	
~~X-2~~	~~T03~~	~~20~~	~~E~~	
1	S02	5133688.000 ~~999,844~~	G	
2	~~T01~~	~~1072800.000~~ ~~12,000~~	~~U~~	
3	S01 ~~T01~~	9560.000 ~~18,000~~	G ~~E~~	
4	T01 ~~S02~~	1319963 ~~3,771,000~~	U ~~G~~	
5	~~T01~~	~~5,700~~	~~E~~	
6	~~T01~~ ~~T01~~	~~9,000~~	~~E~~	
7	~~S02~~	~~357,844~~	~~G~~	
8	T04	357,844.000 ~~Same as above~~	U	
9	~~S02~~	~~5,000~~	~~G~~	
10	S04	6,500,000	G	

Continued from the front.

III. PROCESSES *(continued)*

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES *(code "T04")*. FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

T01- 288,000 -H
T01- 360,000 -H
T01- 288,000 -H
S01- 9333 -G
S01- 227 -G

D80- 1600 (est.) -A
T04- Boiler injection at 6000 GPH
D80- 350 (estimate) - A

IV. DESCRIPTION OF HAZARDOUS WASTES

A. EPA HAZARDOUS WASTE NUMBER — Enter the four–digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four–digit number*(s)* from 40 CFR, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY — For each **listed waste** entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each **characteristic** or **toxic contaminant** entered in column A estimate the total annual quantity of all the non–listed waste*(s)* that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:
   For listed hazardous waste: For each **listed** hazardous waste entered in column A select the code*(s)* from the list of process codes contained in Item III to indicate how the waste will be stored, treated, and/or disposed of at the facility.
   For non–listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code*(s)* from the list of process codes contained in Item III to indicate **all** the processes that will be used to store, treat, and/or dispose of all the non–listed hazardous wastes that possess that characteristic or toxic contaminant.
   Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code*(s)*.
2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER — Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:
1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non–listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. EPA HAZARD. WASTE NO (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2				included with above

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	T/A	C	FOR OFFICIAL USE ONLY	T/A	C	
W T X D 0 9 7 3 1 1 8 4 9	3	1	W DUP		2	DUP

IV. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D 0 0 2	178.000.000 ~~356,000,000~~	T ~~P~~	S 0 2	T 0 1			
2	D 0 0 0	1.000 ~~Unknown, small amount~~	P	S 0 2				
3	D 0 0 2	corrosive 3350.000 ~~6,700,000~~	T ~~P~~	S 0 2	T 0 1			
4	D 0 0 0	250,000	P	S 0 2	T 0 1			
5	D 0 0 0	6672.000 ~~13,344,000~~	P	S 0 2	T 0 4			
6	D 0 0 0	1.000 ~~Unknown, small amount~~	P	S 0 2				
7	D 0 0 7	Chromium 550.000 ~~1,100,000~~	T ~~P~~	S 0 2	T 0 1			
8	D 0 0 0	75,000 .000	P	T 0 1	S 0 2			listed to be compatible with State requirements
A09	F 0 0 3	56,000.000	P	S 0 1				
A09	F 0 0 5	included with above						
11	U 0 1 3	750.000	P	S 0 1				Listed to be compatible with State requirements
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

continued from the front.

IV. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

EPA I.D. NO. *(enter from page 1)*

F	TXD097311849	T/A: 5	C: 6

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground—level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
29 31 ~~47~~	095 06 ~~10~~

VIII. FACILITY OWNER

☒ A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

☐ B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
E	

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
F	G		

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
R. M. McCuistion Vice President	RMMcCuistion	11-18-80

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED

Reference 28

RECORDS OF WELLS, DRILLERS' LOGS, WATER-LEVEL MEASUREMENTS, AND CHEMICAL ANALYSES OF GROUND WATER IN BRAZORIA, FORT BEND, AND WALLER COUNTIES, TEXAS, 1980-84

U.S. GEOLOGICAL SURVEY
Open-File Report 86-68

Prepared in cooperation with the
HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT
and THE CITY OF HOUSTON

RECORDS OF WELLS, DRILLERS' LOGS, WATER-LEVEL MEASUREMENTS, AND CHEMICAL ANALYSES OF GROUND WATER IN BRAZORIA, FORT BEND, AND WALLER COUNTIES, TEXAS, 1980-84

By James F. Williams III, C.E. Ranzau, Jr., W.B. Lind, and L.S. Coplin

U.S. GEOLOGICAL SURVEY
Open-File Report 86-68

Prepared in cooperation with the
HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT
and THE CITY OF HOUSTON

Austin, Texas
1986

Table 7.--Water levels in wells in Fort Bend County--Continued

WELL JY-65-35-102
OWNER: GULF OIL CORP.
DEPTH: 180 FEET
ELEVATION: 81 FEET

DATE	WATER LEVEL
01/17/1980	27.70
08/07/1980	28.32
01/26/1981	28.20
08/11/1981	28.55
07/22/1982	27.69
02/03/1983	28.42
08/11/1983	28.74
02/16/1984	27.03

WELL JY-65-35-302
OWNER: HOUSTON LIGHTING AND POWER CO., W.A.PARRISH PLANT, WELL NO.1
SCREEN: 540-690 FEET
ELEVATION: 74 FEET

DATE	WATER LEVEL
01/18/1980	113.00
10/01/1980	120.00
02/06/1981	119.00
03/20/1981	119.00
05/15/1981	118.00
06/17/1981	120.00
08/21/1981	123.00
09/18/1981	125.00
10/09/1981	123.00
02/12/1982	128.00
03/02/1982	122.00
05/14/1982	118.00
07/02/1982	124.00
08/06/1982	128.00
09/03/1982	128.00
10/08/1982	128.00
11/05/1982	128.00
01/07/1983	129.00
02/11/1983	126.00
03/11/1983	125.00
04/15/1983	124.00
05/27/1983	123.00
06/24/1983	127.00
07/08/1983	128.00
09/09/1983	128.00
10/14/1983	126.00
11/04/1983	127.00
12/21/1983	128.00
02/10/1984	128.00
03/16/1984	126.00
04/06/1984	125.00
05/18/1984	128.00
06/08/1984	128.00
07/13/1984	132.00
09/07/1984	133.00
10/05/1984	131.00
11/09/1984	129.00
12/07/1984	133.00

WELL JY-65-35-303
OWNER: HOUSTON LIGHTING AND POWER CO., W.A.PARRISH PLANT, WELL NO.2
SCREEN: 457-720 FEET
ELEVATION: 72 FEET

DATE	WATER LEVEL
01/18/1980	111.00
10/01/1980	116.00
02/06/1981	115.00
03/20/1981	115.00
05/15/1981	116.00
06/26/1981	120.00
08/21/1981	121.00
09/18/1981	123.00
10/09/1981	121.00
02/12/1982	126.00
03/02/1982	120.00
05/14/1982	117.00
07/06/1982	123.00
08/06/1982	128.00
09/03/1982	129.00
10/08/1982	130.00
11/05/1982	125.00
01/07/1983	125.00
02/11/1983	124.00
03/11/1983	121.00
05/27/1983	123.00
06/24/1983	123.00
07/08/1983	124.00
09/09/1983	123.00
10/14/1983	126.00
11/04/1983	123.00
12/21/1983	123.00
02/10/1984	124.00
03/16/1984	121.00
04/06/1984	123.00
05/18/1984	123.00
06/08/1984	126.00
07/13/1984	129.00
09/07/1984	128.00
10/05/1984	128.00
11/09/1984	125.00
12/07/1984	128.00

WELL JY-65-35-304
OWNER: HOUSTON LIGHTING AND POWER CO., W.A.PARRISH PLANT, WELL NO.3
SCREEN: 453-836 FEET
ELEVATION: 70 FEET

DATE	WATER LEVEL
10/01/1980	108.00
02/06/1981	108.00
03/20/1981	108.00
05/15/1981	105.00
06/17/1981	104.00
08/21/1981	107.00
09/18/1981	106.00
10/09/1981	106.00
02/12/1982	110.00
03/02/1982	103.00
05/14/1982	102.00
07/02/1982	108.00

WELL JY-65-35-304--Cont.

DATE	WATER LEVEL
08/06/1982	111.00
09/03/1982	113.00
10/08/1982	113.00
11/05/1982	113.00
01/07/1983	113.00
02/11/1983	112.00
03/11/1983	112.00
04/15/1983	109.00
05/27/1983	110.00
06/24/1983	112.00
07/08/1983	114.00
09/09/1983	113.00
10/14/1983	108.00
11/04/1983	113.00
12/21/1983	113.00
02/10/1984	115.00
03/16/1984	115.00
04/06/1984	114.00
05/18/1984	115.00
06/08/1984	116.00
07/13/1984	119.00
09/07/1984	121.00
10/05/1984	116.00
11/09/1984	115.00
12/07/1984	117.00

WELL JY-65-43-101
OWNER: C.A. DANKLEF
SCREEN: 275-1195
ELEVATION: 76 FEET

DATE	WATER LEVEL
01/17/1980	82.80
08/07/1980	100.22
01/27/1981	84.94
08/13/1981	97.94
02/24/1982	85.02
07/23/1982	95.79
02/03/1983	97.88
08/11/1983	100.30
02/22/1984	98.60

WELL JY-65-43-602
OWNER: UNKNOWN
DEPTH: 482 FEET
ELEVATION: 57 FEET

DATE	WATER LEVEL
01/17/1980	80.15
08/07/1980	97.50
01/27/1981	82.36
08/13/1981	99.02
03/01/1982	84.28
07/23/1982	91.56
02/03/1983	87.05
08/11/1983	88.74
02/22/1984	89.06

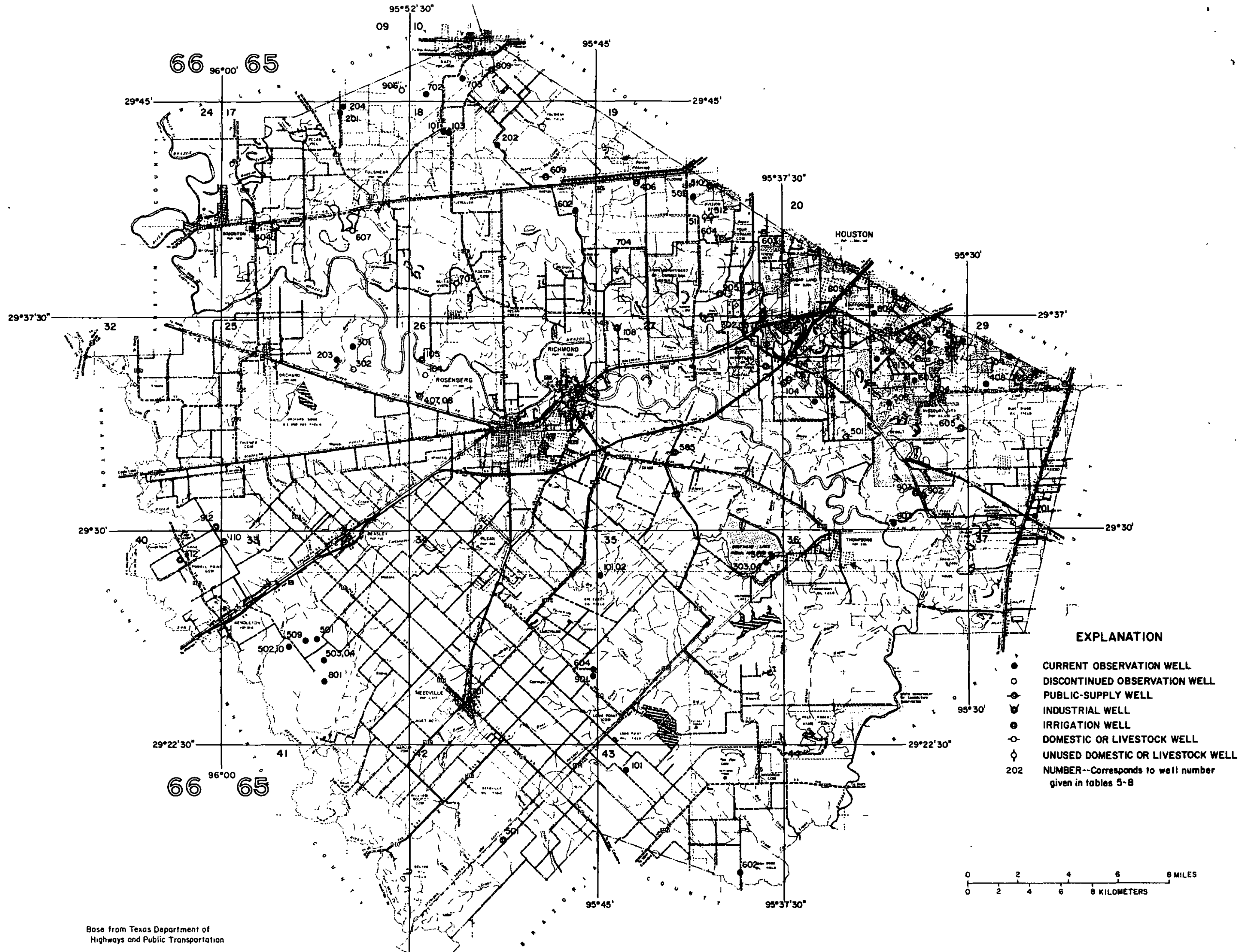


Figure 2.–Locations of wells in Fort Bend County

Reference 29

1 - Permit/CD
2 - AO & AO matl
3 - DMR's
4 - Vio. Sum. Log
5 - NCR
6 - Correspondence
7 - CRAS
Date Filed
Clerk's Inits

(M) TL

Permit No. TX0006394

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C... 1251 et. seq; the "Act"),

Houston Lighting & Power Company
P.O. Box 1700
Houston, Texas 77001

is authorized to discharge from a facility located south of and adjacent to Smithers Lake and Dry Creek, southwest of the Town of Thompsons, Fort Bend County, Texas

to receiving waters named for Outfall 001, Dry Creek thence Rabbs Bayou thence the Brazos River in Segment No. 1202 of the Brazos River basin. Outfall 003 discharges to Smithers Lake. Outfall 002 can discharge to either Smithers Lake or to Dry Creek. Outfalls 004, 005, and 006 discharge to Smithers Lake (Outfall numbers ending with a 3 are internal to Outfall 003)

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I (35 pages), II (9 pages), and III (6 pages) hereof.

This permit shall become effective on July 18, 1988

This permit and the authorization to discharge shall expire at midnight, July 17, 1993

Signed and issued this 17th day of June 1988

Myron E. Knudson

Myron O. Knudson, P.E.
Director
Water Management Division (6W)

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 001

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 001 - blowdown and overflow water from the cooling pond (Smithers Lake).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	37 (*1)	Report
Temperature	N/A	N/A	Report	95°F

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Continuous	Record
Temperature	Continuous	Record

OUTFALL 001

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 001, where Smithers Lake discharges from either the blowdown line or the spillway to Dry Creek.

FOOTNOTES

(*1) Blowdown flow only.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 002

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 002 - stormwater runoff from coal storage area (Units 5, 6, 7, and 8) and coal conveyor washdown commingled with metal cleaning waste (*1).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30 (*4)	50
Oil and Grease	N/A	N/A	15	20
Iron, Total (*2)	N/A	N/A	1.0	1.0
Copper, Total (*2)	N/A	N/A	0.5	1.0

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/occurrence (*3)	Estimate
Total Suspended Solids	1/occurrence (*3)	Grab
Oil and Grease	1/occurrence (*3)	Grab
Iron, Total (*2)	1/occurrence (*3)	Grab
Copper, Total (*2)	1/occurrence (*3)	Grab

OUTFALL 002

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/occurrence by a grab sample (*3).

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 002, where commingled wastewater is discharged from the coal storage retention pond prior to mixing with any other waters and prior to discharge either to Dry Creek or to Smithers Lake.

FOOTNOTES

(*1) See Part II.F.
(*2) To be monitored only when discharging metal cleaning waste.
(*3) Samples shall be taken once during each occurrence or once every 24 hrs. if duration of occurrence is greater than 24 hours.
(*4) Applicable when either metal cleaning wastes or coal conveyor washdown wastes are being discharged.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 003

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 003 - condenser cooling water and previously monitored effluents.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)			
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	2121	2121
Temperature	N/A	N/A	110°F (*2)	118°F
Total Residual Chlorine (*1)	N/A	295	N/A	0.2 mg/l
Biomonitoring	N/A	N/A	N/A	N/A

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Continuous	Record
Temperature	Continuous	Record
Total Residual Chlorine (*1)	1/week (*3)	Grab
Biomonitoring (*4)	Quarterly (*3)	24-hour composite

OUTFALL 003

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 003, where condenser cooling water and previously monitored effluents are discharged from the cooling water discharge canal to Smithers Lake.

FOOTNOTES

(*1) See Part II.D.
(*2) See Part II.C.
(*3) Samples shall be representative of periods of chlorination.
(*4) See Part II.L.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 103

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 103 - metal cleaning wastes (*1), boiler blowdown units 5 and 6, and ash transport water (*2).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20
Iron, Total (*3)	N/A	N/A	1.0	1.0
Copper, Total (*3)	N/A	N/A	0.5	1.0

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab
Iron, Total (*3)	1/week	Grab
Copper, Total (*3)	1/week	Grab

OUTFALL 103

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 103, where commingled wastes are discharged from the treatment facility prior to mixing with the condenser cooling water.

FOOTNOTES

(*1) See Part II.F.
(*2) See Part II.E.
(*3) Limitations and monitoring requirements apply only when discharging metal cleaning wastes.

Outfall 103 was Outfall 101 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 203

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 203 - Units 5 and 6 low volume wastewater (*1) and ash transport water (*2).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab

OUTFALL 203

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 203, where commingled wastes are discharged from the treatment facility prior to mixing with the condenser cooling water.

FOOTNOTES

(*1) See Part II.G.
(*2) See Part II.E.

Outfall 203 was Outfall 201 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 303

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 303 - low volume waste (*1)(units 5 and 6 oily floor drainage).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab

OUTFALL 303

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 303, where low volume waste is discharged from the treatment facility prior to mixing with the condenser cooling water.

FOOTNOTES

(*1) See Part II.G.

Outfall 303 was Outfall 401 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 403

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 403 - low volume waste (*1) (Units 5 and 6 auxiliary cooling tower blowdown).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab

OUTFALL 403

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 403, where low volume waste is discharged prior to mixing with the condenser cooling water.

FOOTNOTES

(*1) See Part II.G.

Outfall 403 was Outfall 501 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 503

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 503 - Units 7 and 8 cooling tower blowdown and/or low volume waste (*1).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids (*2)	N/A	N/A	30	100
Oil and Grease (*2)	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids (*2)	1/week	Grab
Oil and Grease (*2)	1/week	Grab

OUTFALL 503

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 503, where cooling tower blowdown and/or low volume waste is discharged prior to mixing with the condenser cooling water.

FOOTNOTES

(*1) See Part II.G.
(*2) These parameters apply only when discharging cooling tower basin drainage or other low volume waste.

Outfall 503 was Outfall 701 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 603

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 603 - metal cleaning waste from Units 7 and 8 (*1), low volume waste (*2) and ash transport water (*3).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20
Iron, Total (*4)	N/A	N/A	1.0	1.0
Copper, Total (*4)	N/A	N/A	0.5	1.0

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab
Iron, Total (*4)	1/week	Grab
Copper, Total (*4)	1/week	Grab

OUTFALL 603

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 603, where commingled wastes are discharged prior to mixing with the condenser cooling water.

FOOTNOTES

(*1) See Part II.F.
(*2) See Part II.G.
(*3) See Part II.E.
(*4) These parameters apply only when discharging metal cleaning waste.

Outfall 603 was Outfall 801 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 703

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 703 - Units 7 and 8 low volume waste (*1) and ash transport water (*2).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab

OUTFALL 703

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 703, where commingled waste is discharged prior to mixing with the condenser cooling water.

FOOTNOTES

(*1) See Part II.G.
(*2) See Part II.E.

Outfall 703 was Outfall 901 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 803

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 803 - Units 7 and 8 low volume waste (*1).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab

OUTFALL 803

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 803, where low volume waste is discharged prior to mixing with the condenser cooling water.

FOOTNOTES

(*1) See Part II.G.

Outfall 803 was Outfall A01 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 903

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 903 - treated sewage effluent (Units 1 - 4 generating area).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Biochemical Oxygen Demand (5-day)	N/A	N/A	30 mg/l	45 mg/l
Total Suspended Solids	N/A	N/A	30 mg/l	45 mg/l
Fecal Coliform	N/A	N/A	200/100 ml	400/100 ml

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Biochemical Oxygen Demand (5-day)	1/week	Grab
Total Suspended Solids	1/week	Grab
Fecal Coliform	1/week	Grab

OUTFALL 903

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 903, where treated sewage effluent is discharged from the treatment facility prior to mixing with any other waste streams.

Outfall 903 was Outfall B01 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 1003

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 1003 - treated sewage effluent (Units 5 - 8 generating area).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Biochemical Oxygen Demand (5-day)	N/A	N/A	30 mg/l	45 mg/l
Total Suspended Solids	N/A	N/A	30 mg/l	45 mg/l
Fecal Coliform	N/A	N/A	200/100 ml	400/100 ml

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Biochemical Oxygen Demand (5-day)	1/week	Grab
Total Suspended Solids	1/week	Grab
Fecal Coliform	1/week	Grab

OUTFALL 1003

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 1003, where treated sewage effluent is discharged from the treatment facility prior to mixing with any other waste streams.

Outfall 1003 was Outfall C01 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 004

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 004 - stormwater runoff from Units 5 through 8 ash storage area.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day (*1)	Calculated
Total Suspended Solids	1/day (*1)	Grab
Oil and Grease	1/day (*1)	Grab

OUTFALL 004

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 004, where stormwater runoff from Units 5 through 8 ash storage area discharges from the retention ponds into Smithers Lake.

FOOTNOTES

(*1) When discharge occurs.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 005

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 005 - Units 1 through 4 low volume waste (*1).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab

OUTFALL 005

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 005, where low volume waste is discharged from the treatment facility prior to entering Smithers Lake.

FOOTNOTES

(*1) See Part II.G.

Outfall 005 was Outfall 301 in the previous permit.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 006

During the period beginning upon the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge from Outfall 006 - low volume waste (*1) (Units 1 through 4 auxiliary cooling tower blowdown).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (mg/l)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/day	Estimate
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab

OUTFALL 006

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: At Outfall 006, where low volume waste is discharged prior to entering Smithers Lake.

FOOTNOTES

(*1) See Part II.G.

Outfall 006 was Outfall 601 in the previous permit.

SECTION B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

NONE

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

SECTION C. REPORTING OF MONITORING RESULTS

Monitoring results shall be reported in accordance with the provisions of Part III.D.4 of the permit. Monitoring results obtained during the previous month shall be summarized and reported on a Discharge Monitoring Report form postmarked no later than the _____ day of the month following the completed reporting period. The first report is due on ____________ _______.

PART II
OTHER CONDITIONS

A. The term "composite sample" means a sample consisting of a minimum of three grab samples of effluent collected at regular intervals over a normal operating day and combined proportional to flow or a sample continuously collected proportional to flow over a normal operating day.

B. There shall be no discharge of polychlorinated byphenyl transformer fluid.

C. For the purposes of this permit, daily temperature discharge is defined as the flow weighted average temperature (FWAT) and, on a daily basis, shall be monitored and recorded in accordance with Part II, Section C, of this permit. FWAT shall be calculated at equal time intervals not greater than two hours. The method of calculating FWAT is as follows:

$$\text{FWAT} = \frac{\text{SUMMATION (INSTANTANEOUS FLOW X INSTANTANEOUS TEMPERATURE)}}{\text{SUMMATION (INSTANTANEOUS FLOW)}}$$

"Daily average temperature" (also known as average monthly or maximum 30 day value) shall be the arithmetic average of all FWAT's calculated during the calendar month.

"Daily maximum temperature" (also known as the maximum daily value) shall be the highest FWAT calculated during the calendar month.

D. The term "total residual chlorine" (or total residual oxidants for intake water with bromides) means the value obtained using the amperometric method for total residual chlorine described in 40 CFR Part 136.

Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the permitting authority that discharge for more than two hours is required for macroinvertabrate control.

Simultaneous multi-unit chlorination is permitted.

E. The term "ash transport water" shall mean water used in the transport of either fly ash or bottom ash.

F. The term "metal cleaning waste" means any wastewater resulting from cleaning (with or without chemical compounds) any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning.

The term "chemical metal cleaning wastes" means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds, including, but not limited to, boiler tube cleaning.

G. The term "low volume waste sources" means, wastewaters from, but not limited to: wet scrubber air pollution control systems, ion exchange water treatment system, water treatment, evaporator and boiler blowdown, laboratory and sampling streams, floor drainage, cooling tower basin cleaning wastes and blowdown from recirculating house service water systems. Sanitary and air conditioning wastes are not included.

H. The term "coal pile runoff" means the rainfall runoff from or through any coal, ash or other material storage pile.

Any untreated overflow from facilities designed, constructed and operated to treat the volume of "coal pile runoff" which is associated with a 10-year, 24-hour rainfall event shall not be subject to the limitations specified in Part 1, area runoff, of this permit.

The term "10-year, 24-hour rainfall event" shall mean a rainfall event with the probable recurrence interval of once in ten years as defined by the National Weather Service and Technical Paper No. 40, "Rainfall Frequency Atlas of the U.S.," May 1961, and subsequent amendments, or equivalent regional or state rainfall probability information developed therefrom.

I. There shall be no discharge of cooling tower maintenance chemicals which contain the 129 priority pollutants (appendix A of 40 CFR Part 423).

J. Monitoring shall be conducted according to analytical, apparatus and materials, sample collection, preservation, handling, etc., procedures listed at 40 CFR Part 136 [38 FR 28758, 10/16/73, as amended at 41 FR 52781, 12/1/76; 41 FR 52785, 12/1/76; 42 FR 3306, 1/18/77; 42 FR 37205, 7/20/77; 49 FR 43250, 10/26/84; as corrected at 50 FR 690, 1/4/85]. Appendices A, B, and C to Part 136 [49 FR 43250, 10/26/84] are specifically referenced as part of this requirement. Amendments to 40 CFR Part 136 promulgated after the effective date of this permit shall supersede these requirements as applicable.

K. STORET/CAS CROSS-REFERENCE

For the proper identification of parameters being regulated in this permit, the following table lists the corresponding EPA Storet Number and the Chemical Abstract Service (CAS) Registry Number where applicable:

Parameter	Storet	CAS
Flow	50050	---------
Temperature	00011	---------
pH	00400	---------
Total Residual Chlorine	50060	---------
Biochemical Oxygen Demand	00310	---------
Total Suspended Solids	00530	---------
Oil and Grease	00556	---------
Total Copper	01042	7550-50-8
Total Iron	01045	7439-89-6
Fecal Coliform	74055	---------

Chronic Biomonitoring	Storet	CAS
Critical dilution, Static Renewal, 7-day Chronic, Ceriodaphnia dubia	TCP3B	---------
Critical dilution, Static Renewal, 7-day Chronic, Pimephales promelas	TCP6C	---------

The above classification numbers will be helpful in identifying the appropriate analytical, apparatus and materials, sample collection, preservation, handling, etc., procedures listed at 40 CFR Part 136 and at "Methods of Chemical Analysis of Water and Wastes," EPA 600/4-79/020, 1979 (revised March 1983). The EPA Storet number is additionally used to identify parameters on the Discharge Monitoring Report described at Part III.D.4.

L. CHRONIC BIOMONITORING REQUIREMENTS - Applicable to Outfall 003

a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section. Such testing will determine if an appropriately dilute effluent sample affects the survival and reproduction or growth of the appropriate test organism. The permittee shall initiate the following series of tests within 60 days of the effective date of this permit to evaluate wastewater toxicity. All test organisms, procedures, and water quality assurance criterion used shall be in accordance with the latest revision of "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", EPA 600/4-85/014. The following tests shall be used:

1) The permittee shall conduct a 7-day Ceriodaphnia dubia survival and reproduction test (Method 1002.0).

2) The permittee shall conduct a 7-day fathead minnow (Pimephales promelas) larval survival and growth test (Method 1000.0).

b. A minimum of 5 dilutions must be performed in addition to an appropriate control. Dilutions consisting of 100%, 30%, 10%, 3%, and 1% of the final effluent must be contained in the test series. (For clarification purposes for this permit and to aid in completing table one, the critical dilution is equal to 100% effluent).

c. The samples shall be collected at a point following the last treatment unit. Dilution water used in toxicity tests will be the receiving water. If the receiving water is unsatisfactory as a result of pre-existing toxicity (greater than 20% mortality in the control), the permittee must substitute reconstituted dilution water, with hardness and alkalinity similar to that of the receiving water. The permittee shall also report to EPA the toxicity of the receiving water.

d. Flow-weighted 24-hour composite samples representative of dry weather flows during normal operation will be collected from Outfall 003. The toxicity tests shall be performed on the flow-weighted composite samples. Representative grab samples collected during periods of chlorination may be substituted for flow weighted composite samples.

e. The toxicity tests specified in paragraphs (a) and (b) above shall be conducted once per quarter. The permittee shall prepare a full report of the results according to EPA 600/4-85/014, Section 10, Report Preparation. This full report need not be submitted unless requested and shall be retained following the provisions of Part III.C.3 of this permit.

f. The permittee shall submit the toxicity testing information contained in Table 1 of this permit to EPA along with the Discharge Monitoring Report (DMR) submitted for the end of the reporting period following the toxicity test.

g. Should no toxicity occur within the first year of toxicity testing, in accordance with paragraph (h) below for both species tested at the critical dilution, the permittee shall certify this information in writing to EPA Region VI and these biomonitoring requirements shall expire.

h. For the purpose of this biomonitoring requirement, chronic toxicity is defined as a statistically significant difference at the 95% confidence level between the survival and growth or reproduction in the appropriate test organism exposed to the control and to an effluent dilution.

i. This permit shall be reopened to require further monitoring studies and/or effluent limits if biomonitoring data show actual or potential ambient toxicity to be the result of the permittee's discharge to the receiving stream. Modification or revocation of the permit is subject to the provisions of 40 CFR Part 122.62. Accelerated or intensified toxicity testing may be required in accordance with Section 308 of the Clean Water Act.

TABLE 1

BIOMONITORING REPORTING

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

Permittee: Houston Lighting & Power Company
NPDES No.: TX0006394
Outfall No.: 003

Composite collected FROM: ___________ am/pm _____________ date
TO: ___________ am/pm _____________ date

Test initiated: ____________ am/pm ___________________ date

Dilution water used: [ ] Receiving water [ ] Reconstituted water

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Percent effluent (%)

REP	0%	1%	3%	10%	30%	100%
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						

TABLE 1 (Continued)

BIOMONITORING REPORTING

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

Permittee: Houston Lighting & Power Company
NPDES No.: TX0006394
Outfall No.: 003

PERCENT SURVIVAL

Percent effluent (%)

Time of Reading	0%	1%	3%	10%	30%	100%
24h						
48h						
7-day						

1. Fisher's Exact Test:

   Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to:

   a. Critical dilution: ______ YES ______ NO

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

   Is the mean number of young produced per female significantly different (p=0.05) than the control's number of young per female for the % effluent corresponding to:

   a. Critical dilution: ______ YES ______ NO

3. Enter percent effluent corresponding to each NOEL below and circle lowest number:

   a. NOEL survival = ________ % effluent
   b. NOEL reproduction = ________ % effluent

4. If you answered NO to 1.a. and 2.a., enter [N]; otherwise enter [Y]: ____

5. Enter response to item 4 on DMR Form, Parameter No. TCP3B.

TABLE 1 (Continued)

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL TEST
(Pimephales promelas)

Permittee: Houston Lighting and Power Company
NPDES No.: TX0006394
Outfall No.: 003

Composite collected FROM: ________ am/pm ________ date
TO: ________ am/pm ________ date

Test initiated: ________ am/pm ________ date

Dilution water used: [ ] Receiving water [ ] Reconstituted water

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

Effluent Conc. (%)	Average Dry Weight in milligrams in replicate chambers				MEAN DRY WEIGHT	
	A	B	C	D	mg	CV%*
0%						
1%						
3%						
10%						
30%						
100%						

* coefficient of variation = standard deviation x 100/mean

1. Dunnett's Procedure:

Is the mean dry weight (growth) at 7 days effluent significantly different (p=0.05) than the control's dry weight (growth) for the % effluent corresponding to:

a. Critical dilution: ______ YES ______ NO

TABLE 1 (Continued)

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL TEST
(Pimephales promelas)

Permittee: Houston Lighting and Power Company
NPDES No.: TX0006394
Outfall No.: 003

DATA TABLE FOR FATHEAD MINNOW SURVIVAL

Effluent Conc. (%)	Percent Survival in replicate chambers				MEAN PERCENT SURVIVAL			
	A	B	C	D	24h	48h	7-day	CV%*
0%								
1%								
3%								
10%								
30%								
100%								

* coefficient of variation = standard deviation x 100/mean

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

   Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to:

   a. Critical dilution: ______ YES ______ NO

3. Enter percent effluent corresponding to each NOEL below and circle lowest number:

   a. NOEL survival = ________ % effluent
   b. NOEL growth = ________ % effluent

4. If you answered NO to 1.a. and 2.a., enter [N]; otherwise enter [Y]: ____

5. Enter response to item 4 on DMR Form, Parameter No. TCP6C.

PART III
STANDARD CONDITIONS FOR NPDES PERMITS

SECTION A. GENERAL CONDITIONS

1. **Introduction**
In accordance with the provisions of 40 CFR Part 122.41, et. seq., this permit incorporates by reference ALL conditions and requirements applicable to NPDES Permits set forth in the Clean Water Act, as amended, (hereinafter known as the "Act") as well as ALL applicable CFR regulations.

2. **Duty to Comply**
The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

3. **Toxic Pollutants**
   a. Notwithstanding Part III.A.5, if any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition.
   b. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that established those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

4. **Duty to Reapply**
If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application shall be submitted at least 180 days before the expiration date of this permit. The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date. Continuation of expiring permits shall be governed by regulations promulgated at 40 CFR Part 122.6 and any subsequent amendments.

5. **Permit Flexibility**
This permit may be modified, revoked and reissued, or terminated for cause in accordance with 40 CFR 122.62-64. The filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. **Property Rights**
This permit does not convey any property rights of any sort, or any exclusive privilege.

7. **Duty to Provide Information**
The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

8. **Criminal and Civil Liability**
Except as provided in permit conditions on "Bypassing" and "Upsets", nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Any false or materially misleading representation or concealment of information required to be reported by the provisions of the permit, the Act or applicable CFR regulations which avoids or effectively defeats the regulatory purpose of the Permit may subject the Permittee to criminal enforcement pursuant to 18 U.S.C. Section 1001.

9. **Oil and Hazardous Substance Liability**
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

10. **State Laws**
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

11. **Severability**
The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

SECTION B. PROPER OPERATION AND MAINTENANCE

1. **Need to Halt or Reduce not a Defense**
It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

2. **Duty to Mitigate**
The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

3. **Proper Operation and Maintenance**
The permittee shall at all times properly operate and maintain

a. The date, exact place, and time of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

5. **Monitoring Procedures**

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

6. **Flow Measurements**

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to insure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10% from true discharge rates throughout the range of expected discharge volumes. Guidance in selection, installation, calibration, and operation of acceptable flow measurement devices can be obtained from the following references:

a. "A Guide to Methods and Standards for the Measurement of Water Flow", U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 97 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by SD Catalog No. C13.10:421).
b. "Water Measurement Manual", U.S. Department of Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1974, 327 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by Catalog No. I27.19/2:W29/2, Stock No. S/N24003-0027).
c. "Flow Measurement in Open Channels and Closed Conduits", U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Available in paper copy or microfiche from National Technical Information Service (NTIS), Springfield, VA 22151. Order by NTIS No. PB-273535/5ST).
d. "NPDES Compliance Sampling Manual", U.S. Environmental Protection Agency, Office of Water Enforcement, Publication MCD-51, 1977, 140 pp. (Available from the General Services Administration (8FFS), Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, CO 80225).

SECTION D. REPORTING REQUIREMENTS

1. **Planned Changes**

a. **Industrial Permits**

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b); or,

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR Part 122.42(a) (1).

b. **Municipal Permits**

Any change in the facility discharge (including the introduction of any new source or significant discharge or significant changes in the quantity or quality of existing discharges of pollutants) must be reported to the permitting authority. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

2. **Anticipated Noncompliance**

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. **Transfers**

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act.

4. **Discharge Monitoring Reports**

Monitoring results must be reported on Discharge Monitoring Report (DMR) Form EPA No. 3320-1 in accordance with the "General Instructions" provided on the form. The permittee shall submit the original DMR to the EPA with copies of the DMR to the State Agency. Duplicate copies of the DMRs, signed and certified as required by Part III.D. 11 and all other reports required by Part III.D shall be submitted to the Director and to the State (if applicable) at the following address(es):

Water Management Division
Enforcement Branch (6W-E)
U.S. Environmental Protection Agency, Region VI
First Interstate Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Oklahoma (Industrial Permits)
Director
Oklahoma Water Resources Board
P.O. Box 53585
Oklahoma City, Oklahoma 73152

New Mexico:
Program Manager
Surface Water Section
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Louisiana:
Assistant Secretary for Water
Water Pollution Control Division
Louisiana Department of Environmental Quality
P.O. Box 44091
Baton Rouge, Louisiana 70804-4091

position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or an individual occupying a named position; and,

(3) The written authorization is submitted to the Director.

c. Certification. Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

12. **Availability of Reports**

Except for applications, effluent data, permits, and other data specified in 40 CFR 122.7, any information submitted pursuant to this permit may be claimed as confidential by the submitter. If no claim is made at the time of submission, information may be made available to the public without further notice.

SECTION E. PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS

1. **Criminal**

a. **Negligent Violations**

The Act provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

b. **Knowing Violations**

The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

c. **Knowing Endangerment**

The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 303, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

d. **False Statements**

The Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or by both. (See Section 309.c.4 of the Clean Water Act)

2. **Civil Penalties**

The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed $25,000 per day for each violation.

3. **Administrative Penalties**

The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows:

a. **Class I Penalty**

Not to exceed $10,000 per violation nor shall the maximum amount exceed $25,000.

b. **Class II Penalty**

Not to exceed $10,000 per day for each day during which the violation continues nor shall the maximum amount exceed $125,000.

SECTION F. DEFINITIONS

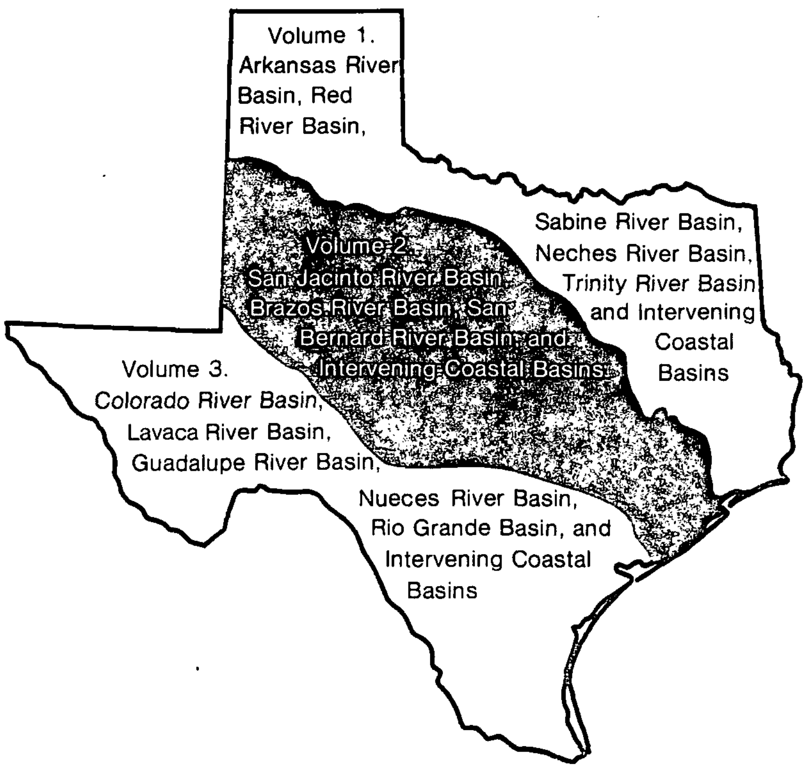
All definitions contained in Section 502 of the Act shall apply to this permit and are incorporated herein by reference. Unless otherwise specified in this permit, additional definitions of words or phrases used in this permit are as follows:

1. "Act" means the Clean Water Act (33 U.S.C. 1251 et. seq.), as amended.
2. "Administrator" means the Administrator of the U.S. Environmental Protection Agency.
3. "Applicable effluent standards and limitations" means all state and Federal effluent standards and limitations to which a discharge is subject under the Act, including, but not limited to, effluent limitations, standards of performance, toxic effluent standards and prohibitions, and pretreatment standards.
4. "Applicable water quality standards" means all water quality standards to which a discharge is subject under the Act and which have been (a) approved or permitted to remain in effect by the Administrator following submission to him/her, pursuant to Section 303(a) of the Act, or (b) promulgated by the Administrator pursuant to Section 303(b) or 303(c) of the Act.
5. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
6. "Daily Discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the "daily discharge" is calculated as the total mass of the pollutant

Reference 30

Water Resources Data Texas Water Year 1987

Volume 2. San Jacinto River Basin, Brazos River Basin, San Bernard River Basin, and Intervening Coastal Basins



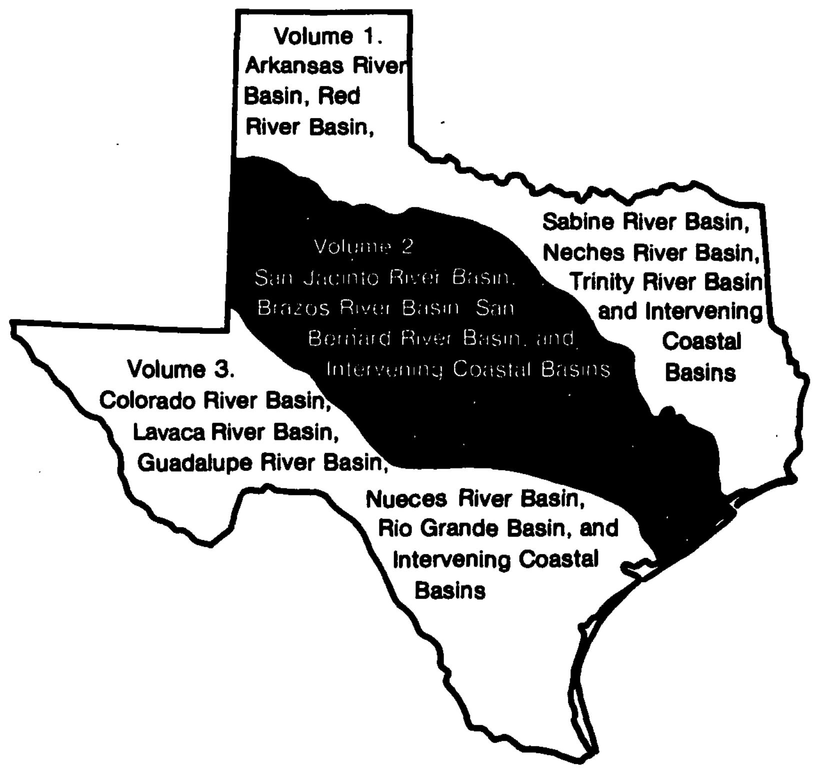
U.S. GEOLOGICAL SURVEY WATER-DATA REPORT TX-87-2

Prepared in cooperation with the State of Texas
and with other agencies

Water Resources Data
Texas
Water Year 1987

Volume 2. San Jacinto River Basin, Brazos River Basin, San Bernard River Basin, and Intervening Coastal Basins

by H.D. Buckner, E.R. Carrillo, and H.J. Davidson



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT TX-87-2

Prepared in cooperation with the State of Texas and with other agencies

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to
District Chief, Water Resources Division
U.S. Geological Survey
300 East 8th Street
Austin, Texas 78701

1988

08114000 BRAZOS RIVER AT RICHMOND, TX

LOCATION.--Lat 29°34'56", long 95°45'27", Fort Bend County, Hydrologic Unit 12070104, on right bank at downstream side of downstream bridge on U.S. Highway 59 in Richmond, 925 ft downstream from Texas and New Orleans Railroad Co. bridge, and at mile 92.0.

DRAINAGE AREA.--45,007 mi², approximately, of which 9,566 mi² probably is noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--January 1903 to June 1906, October 1922 to current year. Published as "at Rosenberg" October 1922 to September 1931 and equivalent except for diversion by Richmond Irrigation Co.'s canal. June to November 1901 and June to September 1902 in U.S. Department of Agriculture, Office of Experiment Stations, Bulletin Nos. 119 and 133. Gage-height records collected in this vicinity since 1914 are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 1392: 1933. WSP 1632: 1958. WDR TX-76-2: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 37.94 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1922, various types of nonrecording gages at railroad bridge 925 ft upstream at different datums. Oct. 1, 1922, to Sept. 30, 1931, nonrecording chain gage at Rosenberg 7.6 mi upstream at datum about 7 ft higher; Oct. 1, 1931, to Sept. 30, 1975, water-stage recorder at present site at datum 3.00 ft higher.

REMARKS.--No estimated daily discharges. Records good except those for June 12-20, which are fair. Considerable water is diverted above station for irrigation and municipal supply. For statement regarding regulation by upstream reservoirs and Soil Conservation Service floodwater-retarding structures, see station 08110200. Gage-height telemeter at station.

~~AVERAGE DISCHARGE.--20 years (water years 1904-05, 1923-40) unregulated, 7,209 ft³/s (5,223,000 acre-ft/yr); 47 years~~ (water years 1941-87) regulated, 7,301 ft³/s (5,290,000 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 123,000 ft³/s June 6, 1929 (gage height, 43.6 ft, from floodmarks), present site and datum; minimum daily, 35 ft³/s Aug. 23, 1934.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since at least 1852, 51.2 ft Dec. 10, 1913, present datum, from floodmarks on right bank 1,000 ft upstream from gage. From information by Texas and New Orleans Railroad Co., stages of other floods at railroad bridge, present datum, are as follows: May 1884, 46.7 ft; June 13, 1885, 47.7 ft; July 1899, 48.6 ft; May 2, 1915, 46.3 ft; and May 9, 1922, 43.9 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 67,800 ft³/s June 17 at 1000 hours (gage height, 32.18 ft); minimum daily, 1,650 ft³/s Sept. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1986 TO SEPTEMBER 1987
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4430	7960	11500	19000	9070	29500	11400	4830	17000	23700	9250	3620
2	3980	9530	9520	19800	9420	28500	10700	4740	27000	22400	7780	3140
3	3650	9790	8040	19700	10000	27300	10000	4680	31800	20500	6620	2810
4	3250	9850	7410	19000	9930	23900	9460	4730	50200	18200	6810	2510
5	2850	9890	7140	18200	9800	19600	9210	4780	59800	16200	7550	2310
6	2410	9040	6970	17500	9560	17300	8960	4530	55700	16700	7890	2190
7	2260	8450	7160	16200	9330	19200	8750	4280	54100	18600	7460	2040
8	2440	8330	7570	14800	9360	24700	8680	4130	52100	19100	7080	1930
9	2740	8650	7770	13700	9360	26000	8620	5080	47700	18800	6650	1950
10	3240	8220	7790	12800	9120	26000	8520	6160	42600	23100	6570	1820
11	4030	7290	7270	12600	8700	26200	8770	4960	43200	22600	6040	1830
12	6160	7190	6390	12400	8320	25900	9900	3910	50700	17900	5610	2180
13	9530	9700	6630	12400	8070	23100	11200	5110	58000	16100	5060	2090
14	13100	10300	8770	12300	7780	19700	11400	7180	62100	15100	4970	2330
15	17100	8100	12800	12200	7190	17700	11900	5190	64600	14800	5590	2350
16	19300	7450	19700	12000	7420	16700	12900	4530	66500	14300	5520	1990
17	17100	7340	28000	12400	8490	15800	13400	4930	67500	13600	5260	1700
18	15100	6750	30600	13600	8370	16100	13000	5570	62000	13700	4980	1710
19	15300	5980	30100	14900	7830	20600	11200	4930	46300	13400	4660	2360
20	15300	5280	26900	13400	7710	23300	9710	4210	30900	12800	4550	2600
21	14000	4790	25600	11400	7910	23100	9080	4050	25800	12900	4750	1970
22	11500	4520	26200	11000	10000	20700	8480	4380	26200	13600	4940	1720
23	9540	4680	28800	11000	10400	18600	7700	4190	29000	12900	4920	1650
24	8380	5280	36800	9750	9660	16600	7220	4470	31100	12400	4840	1850
25	7880	6810	45400	9060	10200	15000	6680	4790	31400	12100	4540	2380
26	14600	7490	50000	9910	15600	14000	6020	4590	32000	12000	3890	2430
27	20500	13300	51300	10600	23100	13800	5580	4830	33100	11900	3540	1900
28	17000	17100	42300	10900	28100	13900	5330	4990	33100	11100	3370	1880
29	11300	14900	29200	10900	---	13700	5130	5080	30300	10200	3320	1990
30	8470	13200	21100	10600	---	13200	4900	5930	25700	9930	3660	2470
31	7370	---	18700	10100	---	12300	---	9040	---	9790	3940	---
TOTAL	293810	257160	633430	414120	289800	622000	273800	154800	1287500	480420	171610	65700
MEAN	9478	8572	20430	13360	10350	20060	9127	4994	42920	15500	5536	2190
MAX	20500	17100	51300	19800	28100	29500	13400	9040	67500	23700	9250	3620
MIN	2260	4520	6390	9060	7190	12300	4900	3910	17000	9790	3320	1650
AC-FT	582800	510100	1256000	821400	574800	1234000	543100	307000	2554000	952900	340400	130300

CAL YR 1986 TOTAL 3274610 MEAN 8972 MAX 51300 MIN 1370 AC-FT 6495000
WTR YR 1987 TOTAL 4944150 MEAN 13550 MAX 67500 MIN 1650 AC-FT 9807000

08114000 BRAZOS RIVER AT RICHMOND, TX--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Chemical analyses: October 1941 to current year. Chemical and biochemical analyses: January 1968 to current year. Pesticide analyses: October 1967 to May 1982. Sediment analyses: April 1957 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1941 to current year.
WATER TEMPERATURE: November 1950 to current year.
SUSPENDED-SEDIMENT DISCHARGE: January 1966 to September 1986.

REMARKS.--Mean monthly and annual concentrations and loads for selected chemical constituents have been computed using the daily (or continuous) records of specific conductance and regression relationships between each chemical constituent and specific conductance. Regression equations developed for this station may be obtained from the Geological Survey District office upon request.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 2,600 microsiemens Sept. 4, 1978; minimum daily, 172 microsiemens Oct. 31, 1984.
WATER TEMPERATURE: Maximum daily, 33.0°C Aug. 5, 1951; minimum daily, 1.0°C Jan. 8, 1970.
SEDIMENT CONCENTRATION: Maximum daily mean, 13,500 mg/L Apr. 4, 1979; minimum daily mean, 8 mg/L Nov. 29, 1967, Sept. 20, and Oct. 6, 7, 1980.
SEDIMENT LOAD: Maximum daily, 1,860,000 tons Apr. 4, 1979; minimum daily, 9.8 tons Oct. 11, 1983.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,700 microsiemens Apr. 18, 19; minimum daily 317 microsiemens Dec. 29.
WATER TEMPERATURE: Maximum daily; 30.0 on several days during August; minimum daily, 7.0°C Jan. 23.

WATER QUALITY DATA, WATER YEAR OCTOBER 1986 TO SEPTEMBER 1987

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	PH (STAND-ARD UNITS)	TEMPER-ATURE WATER (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
DEC 09...	1330	7830	846	7.60	14.0	110	9.4	91	1.3	520	490
JAN 12...	1315	12400	598	7.80	10.5	150	12.0	106	1.3	92	84
MAR 03...	1305	27400	489	7.60	13.5	450	8.9	84	2.9	580	920
APR 20...	1342	9640	1650	8.00	21.5	90	8.2	92	0.8	880	120
JUN 09...	1340	47600	768	7.50	24.5	360	6.5	77	1.8	500	1000
JUL 28...	1330	11100	570	7.80	28.5	260	6.9	89	0.6	680	130

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCARB WH WAT TOT FLD MG/L AS CACO3	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY WH WAT TOTAL FIELD MG/L AS CACO3	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
DEC 09...	200	85	59	12	88	3	5.2	113	86	140	0.30
JAN 12...	190	42	59	9.9	48	2	4.2	146	53	72	0.20
MAR 03...	150	62	48	7.2	40	1	4.6	88	52	75	0.30
APR 20...	340	190	98	22	200	5	5.2	143	200	320	0.30
JUN 09...	180	76	56	9.6	79	3	4.8	104	86	120	0.30
JUL 28...	200	54	58	13	43	1	4.0	145	50	62	0.30

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)
DEC 09...	8.4	497	470	0.480	--	0.020	<0.010	0.500	0.540	0.030
JAN 12...	8.8	352	340	0.890	--	0.010	<0.010	0.900	0.890	0.030
MAR 03...	10	297	290	2.41	2.31	0.290	0.290	2.70	2.60	0.040
APR 20...	6.3	957	940	0.490	--	0.010	<0.010	0.500	0.480	0.030
JUN 09...	9.9	437	430	0.490	0.430	0.010	0.010	0.500	0.440	0.030
JUL 28...	10	344	330	0.380	--	0.020	<0.010	0.400	0.330	0.020

08114000 BRAZOS RIVER AT RICHMOND, TX--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1986 TO SEPTEMBER 1987

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
DEC 09...	0.010	1.3	1.3	0.090	0.100	0.090	0.28	289	6110	76
JAN 12...	0.050	0.77	0.80	0.190	0.090	0.060	0.18	321	10700	99
MAR 03...	0.040	1.9	1.9	0.350	0.080	0.060	0.18	1350	99900	88
APR 20...	0.050	0.47	0.50	0.300	0.070	0.050	0.15	423	11000	65
JUN 09...	0.040	2.6	2.6	0.240	0.030	0.050	0.15	1410	181000	87
JUL 28...	0.010	0.68	0.70	0.200	0.100	0.040	0.12	711	21300	77

DATE	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
DEC 09...	10	2	90	2	1	<1	<3	2	11	<5
JAN 12...	--	--	--	--	--	--	--	--	--	--
MAR 03...	70	2	71	<0.5	1	<1	<3	6	110	<5
APR 20...	--	--	--	--	--	--	--	--	--	--
JUN 09...	70	3	90	<0.5	3	<1	<3	14	68	<5
JUL 28...	30	3	79	<0.5	<1	<1	<3	4	19	14

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
DEC 09...	16	<1	<0.1	<10	1	<1	<1	610	<6	<3
JAN 12...	--	--	--	--	--	--	--	--	--	--
MAR 03...	11	4	<0.1	<10	4	<1	<1	410	<6	15
APR 20...	--	--	--	--	--	--	--	--	--	--
JUN 09...	17	2	<0.1	<10	2	<1	<1	510	<6	10
JUL 28...	17	2	<0.1	<10	<1	1	<1	650	<6	4

MONTHLY AND ANNUAL MEANS AND LOADS FOR OCTOBER 1986 TO SEPTEMBER 1987

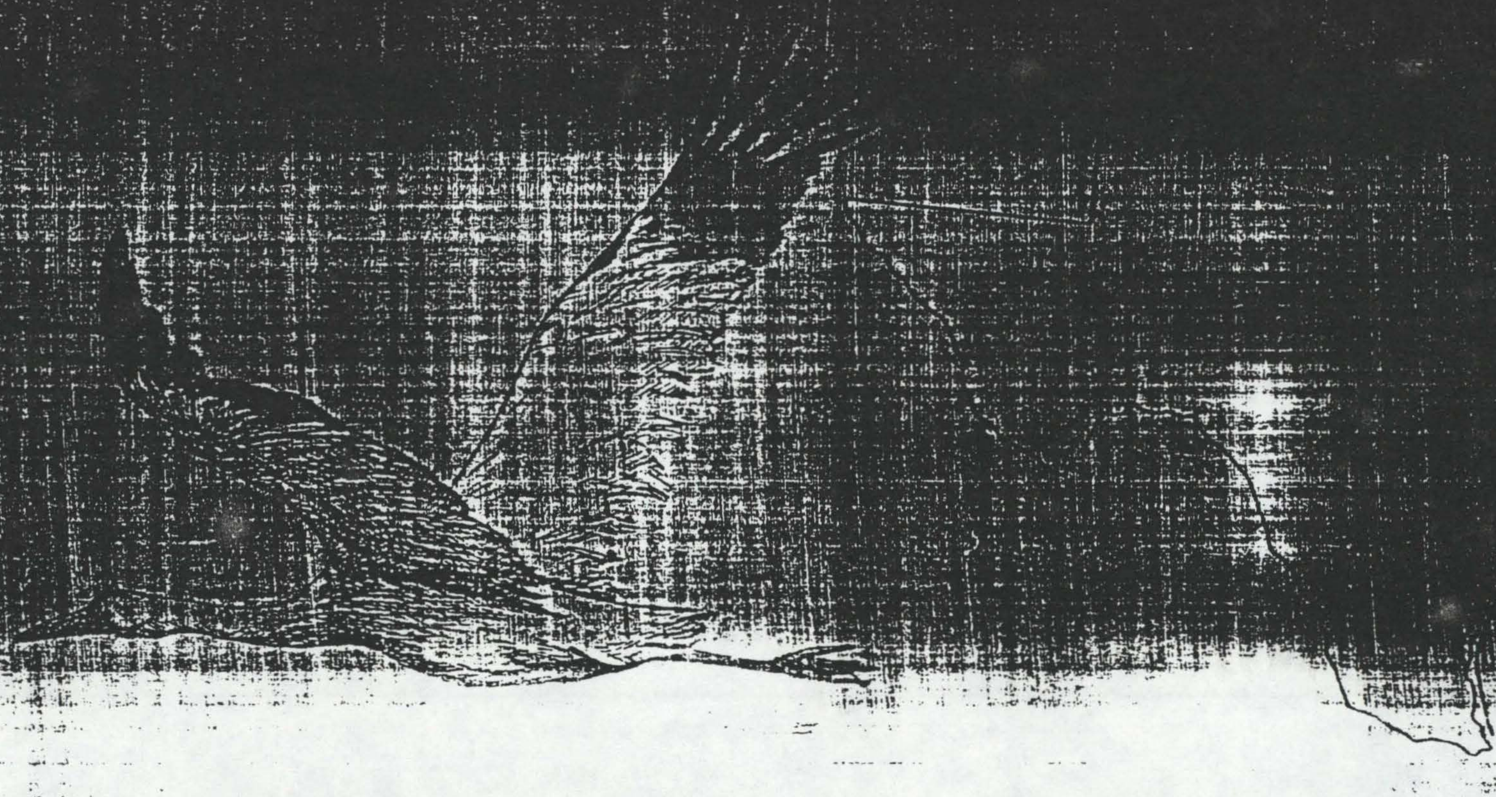
MONTH YEAR	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCTANCE (MICROSIEMENS)	DISSOLVED SOLIDS (MG/L)	DISSOLVED SOLIDS (TONS)	DISSOLVED CHLORIDE (MG/L)	DISSOLVED CHLORIDE (TONS)	DISSOLVED SULFATE (MG/L)	DISSOLVED SULFATE (TONS)	HARDNESS (CA,MG) (MG/L)
OCT. 1986	293810	1260	711	564000	230	182300	130	100600	270
NOV. 1986	257160	918	517	359000	140	98600	92	63600	230
DEC. 1986	633430	462	260	444000	57	96700	46	77900	140
JAN. 1987	414120	666	375	419000	89	99500	66	73700	190
FEB. 1987	289800	877	494	387000	130	101800	87	68300	230
MAR. 1987	622000	912	514	863000	140	241900	91	153000	230
APR. 1987	273800	1300	733	542000	240	174800	130	96600	280
MAY 1987	154800	1100	622	260000	190	77700	110	46200	260
JUNE 1987	1287500	769	433	1505000	110	387400	76	265700	200
JULY 1987	480420	719	404	525000	99	128500	71	92400	200
AUG. 1987	171610	695	391	181000	94	43500	69	31900	190
SEPT 1987	65700	1020	575	102000	160	28700	100	18100	250
TOTAL	4944150	**	**	6151000	**	1661000	**	1088000	**
WTD.AVG.	13550	818	461	**	120	**	82	**	210

Reference 31

Endangered and Threatened Species of Texas and Oklahoma

1987

WITH 1988 ADDENDUM



PREFACE

The Endangered Species Act was passed in 1973 to check the precipitous decline of native fish, wildlife, and plants in the United States. The U.S. Fish and Wildlife Service is charged with determining which species face extinction through man's alteration of their habitat, protecting them from further decline and providing for their continued survival. All Federal agencies are charged with using their authorities to carry out programs for the conservation of endangered species and threatened species and must ensure that any action authorized, funded, or carried out by them does not jeopardize the continued existence of any endangered or threatened species or result in the adverse modification of critical habitat of such species.

This summary of Federally listed endangered and threatened species in Texas and Oklahoma has been compiled by the Albuquerque Regional Office of the U.S. Fish and Wildlife Service. The information provided is for general knowledge only; specific data can be obtained from:

U.S. Fish and Wildlife Service
Office of Endangered Species
P.O. Box 1306
Albuquerque, New Mexico 87103
(505) 766-3972

Ecological Services Field Office
U.S. Fish & Wildlife Service
222 S. Houston, Suite A
Tulsa, Oklahoma 74127
(918) 581-7458

Ecological Services Field Office
U.S. Fish & Wildlife Service
819 Taylor Street, Rm. 9A33
Fort Worth, Texas 76102
(817) 334-2961

Ecological Services Field Office
U.S. Fish & Wildlife Service
c/o Corpus Christi State University
Campus Box 338, 6300 Ocean Drive
Corpus Christi, Texas 78412
(512) 888-3346

Ecological Services Field Office
U.S. Fish & Wildlife Service
17629 E. Camino Real, Suite 211
~~Houston~~, Texas 77058 ~~CLEAR LAKE~~
~~(713) 229-368~~2
713 750 · 1700 Julie MASSEY

Only plants and animals that are Federally listed as endangered or threatened species have been included in this summary. In addition to these Federally listed species, Texas Parks and Wildlife Department has a list of rare species which have legal protection within State boundaries, and Oklahoma has a list of rare species. Information regarding State-listed species may be obtained from:

Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744
(512) 479-4800

Oklahoma Department of Wildlife Conservation
1801 N. Lincoln, P.O. Box 53465
Oklahoma City, Oklahoma 73152
(405) 521-3851

PIPING PLOVER.....*Charadrius melodus*

STATUS: Endangered in the watershed of the Great Lakes, threatened in the remainder of its range (including coastal Texas; 50 FR 50726; December 11, 1985) without critical habitat.

SPECIES DESCRIPTION: A small, stocky shorebird about seven inches long with a wingspan of about 15 inches. Both sexes have pale brownish upper parts and white underparts. A dark band encircling the body below the collar and a dark stripe across the forecrown are distinguishing marks in summer adults, but are obscure in winter.

HABITAT: Nest sites include sandy beaches along the ocean or inland lakes; bare areas on dredge-created and natural alluvial islands in rivers; gravel pits along rivers; and salt-encrusted bare areas of sand, gravel or pebbly mud on interior alkali lakes and ponds. During the winter, piping plovers utilize beaches, sandflats, and dunes along the Gulf Coast and adjacent offshore islands. Spoil islands in intercoastal waterways are also used.

DISTRIBUTION:

Historic: Common along the Atlantic and Gulf Coasts, and on the northern Great Plains, the Great Lakes and the Bahamas and West Indies.

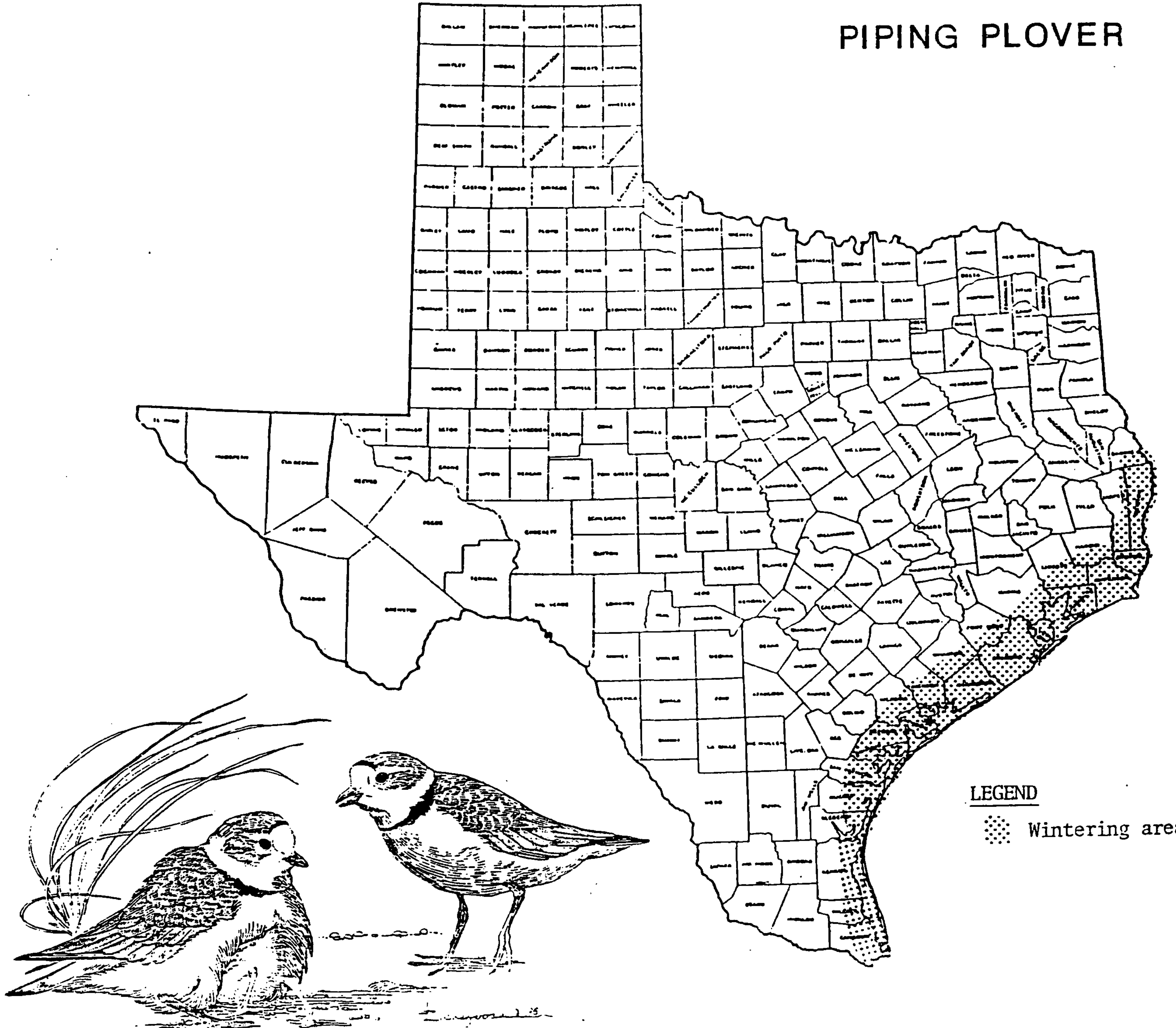
Present: Drastically reduced, remnant populations occur throughout historic range.

REASONS FOR DECLINE: Loss or modification of habitat due to commercial, residential, and recreational developments, dune stabilization, damming and channelization of rivers (eliminating sandbars, encroachment of vegetation, and altering water flows), and wetland drainage. Other threats include human disturbance, egg predation by feral pets, and recreational use of habitat.

OTHER INFORMATION: Piping plover recovery plan drafted 1986; recovery team appointed. Listed as endangered by the States of Michigan, Wisconsin, Minnesota, and Iowa, and as threatened by New York, South Dakota, and Nebraska. Survey work is underway and is planned to continue. Conservation efforts have included: research into habitat requirements, predation, and feeding ecology; habitat protection and acquisition; law enforcement; and educational efforts.

REFERENCES: [illegible] and Oring 1985; Haig 1986, 1987; USFWS 1986d.

PIPING PLOVER



WHOOPING CRANE (Rocky Mountain population)....*Grus americana*
(Wood Buffalo-Aransas Population)

STATUS: Endangered (32 FR 4001, March 11, 1967; 35 FR 8495, June 2, 1970) with critical habitat (43 FR 20938, May 15, 1978)

SPECIES DESCRIPTION: The tallest American bird; males approach 5 feet tall. A very large, snowy white, long-necked bird with long legs that normally trail behind in flight, black primary feathers, a red crown, and a wedge-shaped patch of black feathers behind the eye.

HABITAT: Marshes, river bottoms, potholes, prairies, and cropland. Whooping cranes feed on small grains (corn, wheat, sorghum, barley) in agricultural fields, green forage (alfalfa, winter wheat), aquatic plants (tubers and leaves), insects, crustaceans, and small vertebrate animals.

DISTRIBUTION: Breeds in isolated, marshy areas in Wood Buffalo National Park, Northwest Territory, Canada; winters primarily in Aransas and Calhoun Counties, Texas, in marshes, tidal flats, uplands, and barrier islands.

<u>Historic</u>: Originally found over most of North America. In the 19th century the main breeding area was from the Northwest Territory in Canada to the prairie provinces and northern prairie states to Illinois. A nonmigratory flock existed in Louisiana, but is no longer extant. Wintered in the Carolinas, along the Texas Gulf coast, and the high plateaus of central Mexico.

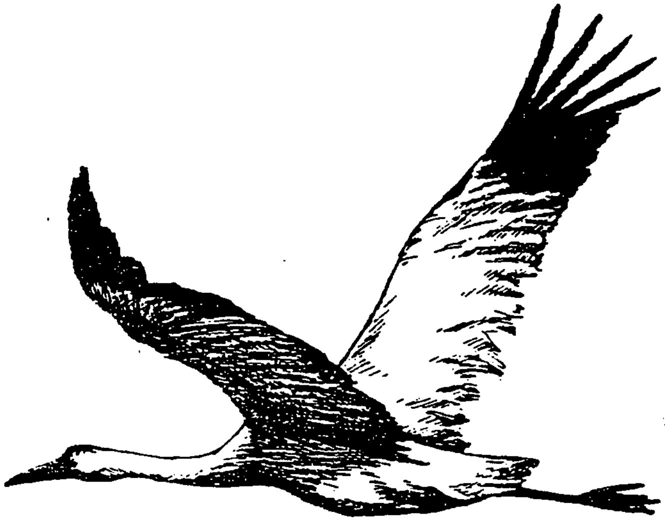
<u>Present</u>: Passes through the central and eastern panhandle of Texas on its migration (October-November in the autumn, April-May in the spring). Migration stopover areas exist in this corridor. Migrate as singles, pairs, family groups (normally three) or in small flocks, sometimes in the company of sandhill cranes. Winters on Aransas National Wildlife Refuge and adjacent areas of the central Texas coast.

REASONS FOR DECLINE: Destruction of wintering and breeding habitat, shooting, collisions with powerlines and fences, specimen collecting, and human disturbance.

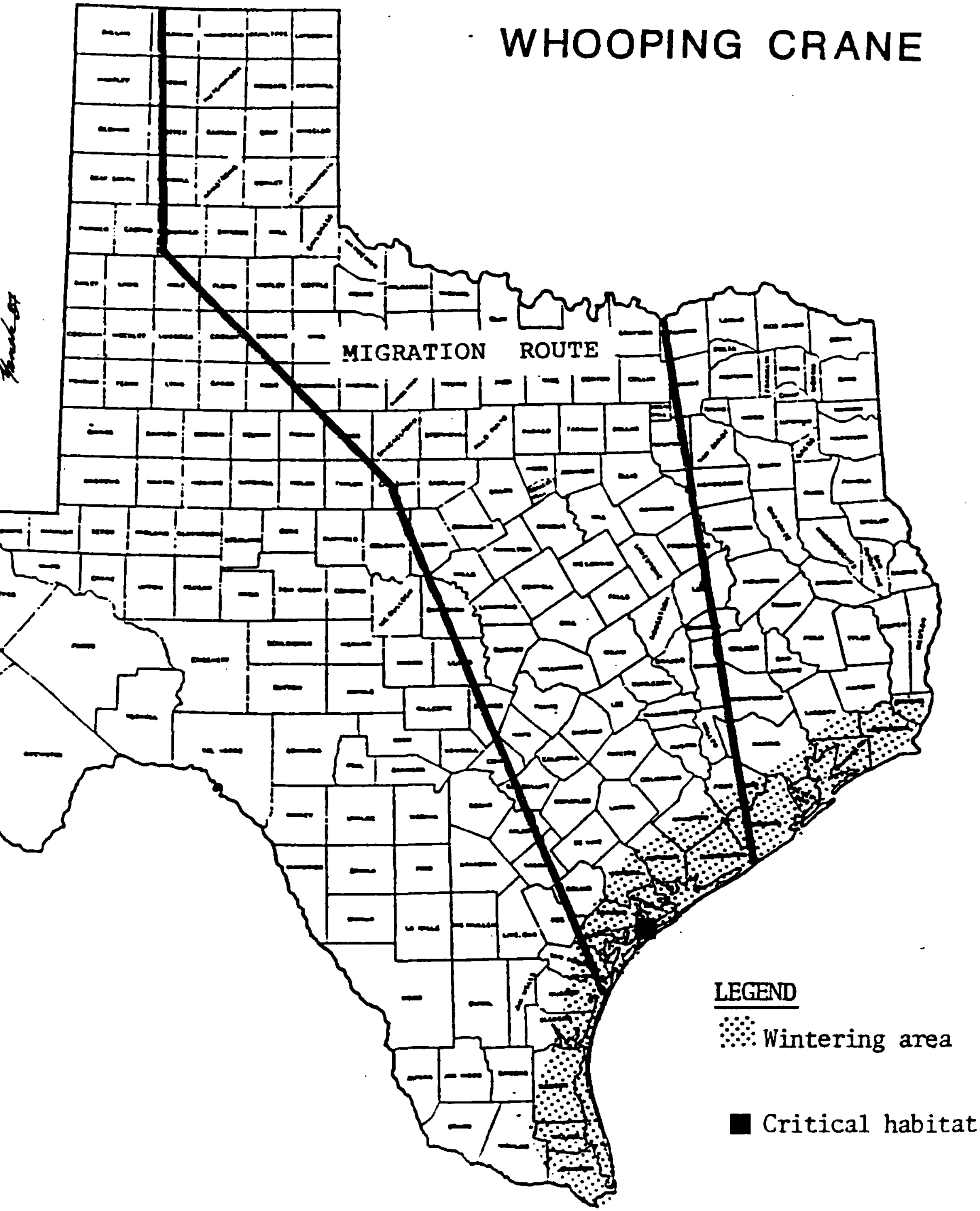
OTHER INFORMATION: Recovery team appointed in 1976. Recovery plan published in 1980 and revised in 1986. Protected by Canada and Mexico. Intensive captive-breeding program conducted by the Service and the Canadian Wildlife Service.

REFERENCES: Allen 1952, USFWS 1986f.

WHOOPING CRANE



Drawing by John Yanek for the Houston Cronicle



AMERICAN ALLIGATOR.....*A[illegible]gator mississipiensis*

STATUS:	Reclassified to threatened due to similarity of appearance in Texas on June 20, 1985 (50 FR 25678). Original classification was endangered (32 FR 4001; March 11, 1967) without critical habitat.
SPECIES DESCRIPTION:	A large (up to 16 feet) lizard-like reptile with broadly rounded snout. General coloration of adults is grayish-black.
HABITAT:	Rivers, bayous, creeks, oxbows, swamps, estuaries, lakes, and marshes.
DISTRIBUTION:	Southeastern U.S. from North Carolina to Texas.
Historic:	In Texas, from the coastal plain westward to the Balcones Fault line.
Present:	Alligators currently occur in more than 90% of their historic range. In Texas, the greatest concentrations occur in the middle and upper coastal counties. Significant populations occur inland in suitable habitat.
REASONS FOR DECLINE:	Hunting and destruction of habitat; young are heavily subject to predation and human disturbance.
REFERENCES:	Neill 1971, Raun and Gehlbach 1972, USFWS 1973, Conant 1975, Thompson et al 1984.

AMERICAN ALLIGATOR

BALD EAGLE.....Haliaeetus leucocephalus

STATUS: Endangered (32 FR 4001, March 11, 1967; 43 FR 6233, February 14, 1978) without critical habitat

SPECIES DESCRIPTION: Large eagle with white head and tail in the adult; immatures are dark or mottled. Feet are bare of feathers. Wingspan is 6-7.5 feet.

HABITAT: Bald eagles require large trees or cliffs near water with abundant fish for nesting. They spend the winters along major rivers, reservoirs, or in areas where carrion is available. For nesting eagles, fish are the primary food source. Waterfowl, rabbits, and carrion are also important food items for transient and wintering eagles.

DISTRIBUTION:

Historic: Found throughout the U.S., Canada, and northern Mexico.

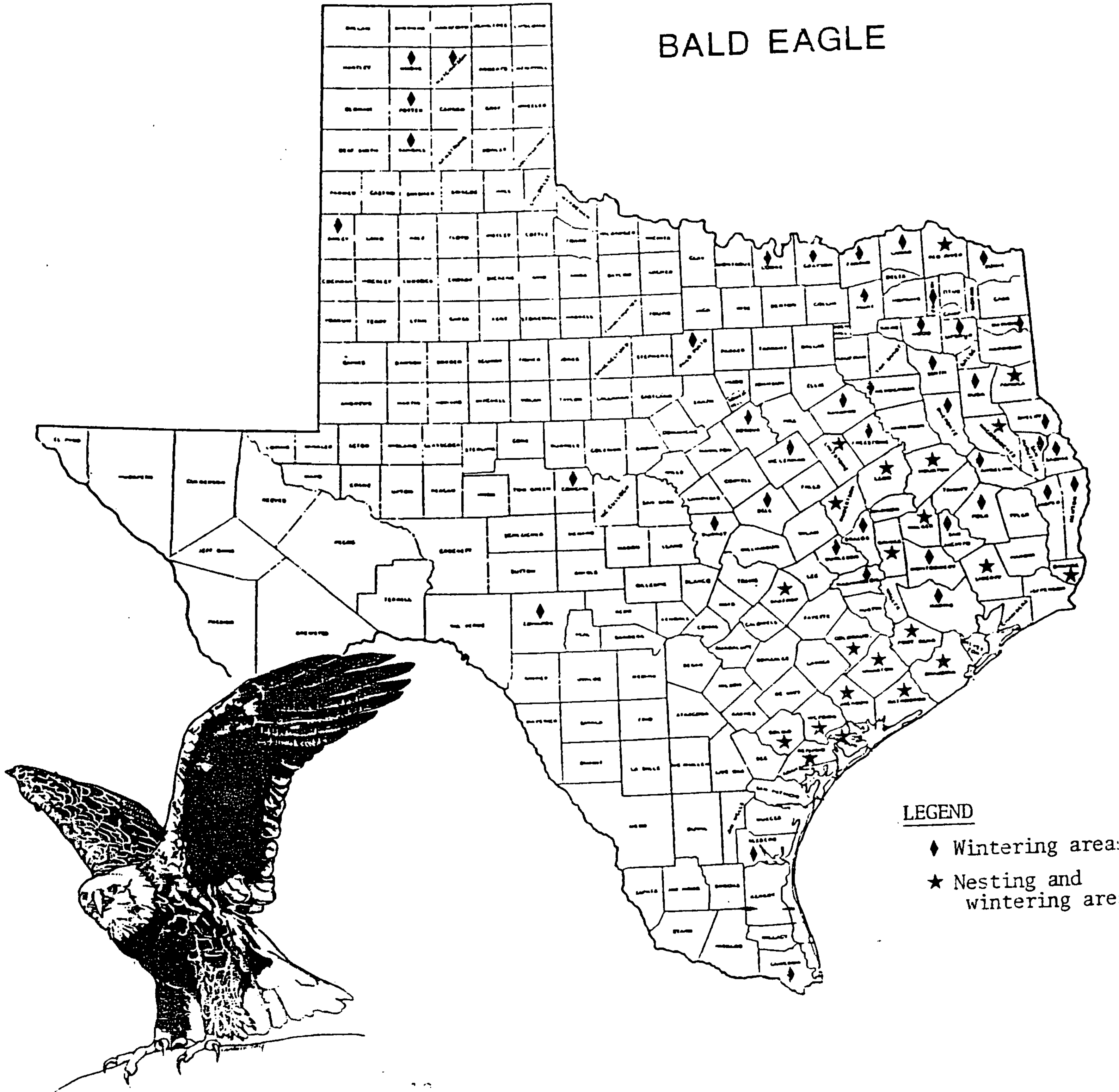
Present: Current breeding range has diminished slightly, but most areas remain occupied with fewer breeding pairs. Wintering populations still may occur statewide. Winter concentrations occur around large bodies of water from December through March. Seventeen nesting territories are known in east Texas along rivers, near reservoirs, and along the Gulf Coast.

REASONS FOR DECLINE: Degradation and loss of riparian habitat, pesticide-induced reproductive failure, and human disturbance (including shooting, poisoning and trapping).

OTHER INFORMATION: Southeastern Bald Eagle Recovery Plan approved in 1983. The bald eagle is endangered in all but five of the lower 48 States. In Washington, Oregon, Minnesota, Wisconsin, and Michigan, it is listed as threatened. It is not listed in Alaska, Mexico, or Canada. Nesting populations are gradually increasing in most areas of the country, including Texas.

REFERENCES: Lish 1975, USFWS 1983b, Busch (in press).

BALD EAGLE



INTERIOR LEAST TERN (Interior population).....*Sterna antillarum*

STATUS: Threatened (50 FR 21784; May 28, 1985) without critical habitat

SPECIES DESCRIPTION: Least terns are small birds with a 20-inch wingspan. Sexes are alike, characterized in the breeding plumage by a black crown, white forehead, grayish back and dorsal wing surfaces, snowy white undersurfaces, orange legs, and a black-tipped yellow bill. Breeding colonies contain from about 5 to 75 nests.

HABITAT: Important characteristics of its breeding habitat include: (1) The presence of bare or nearly bare ground and alluvial islands or sandbars for nesting, (2) the availability of food (primarily small fish), and (3) the existence of favorable water levels during the nesting season (so nests remain above water).

DISTRIBUTION:

Historic: Sand bars on the Colorado (in Texas), Red, Rio Grande, Arkansas, Missouri, Ohio and Mississippi Rivers systems; braided rivers of northwest Oklahoma and southwest Kansas; (salt) flats of northwest Oklahoma (Salt Plains National Wildlife Refuge); mud playa lakes in southeastern New Mexico (Bitter Lakes National Wildlife Refuge).

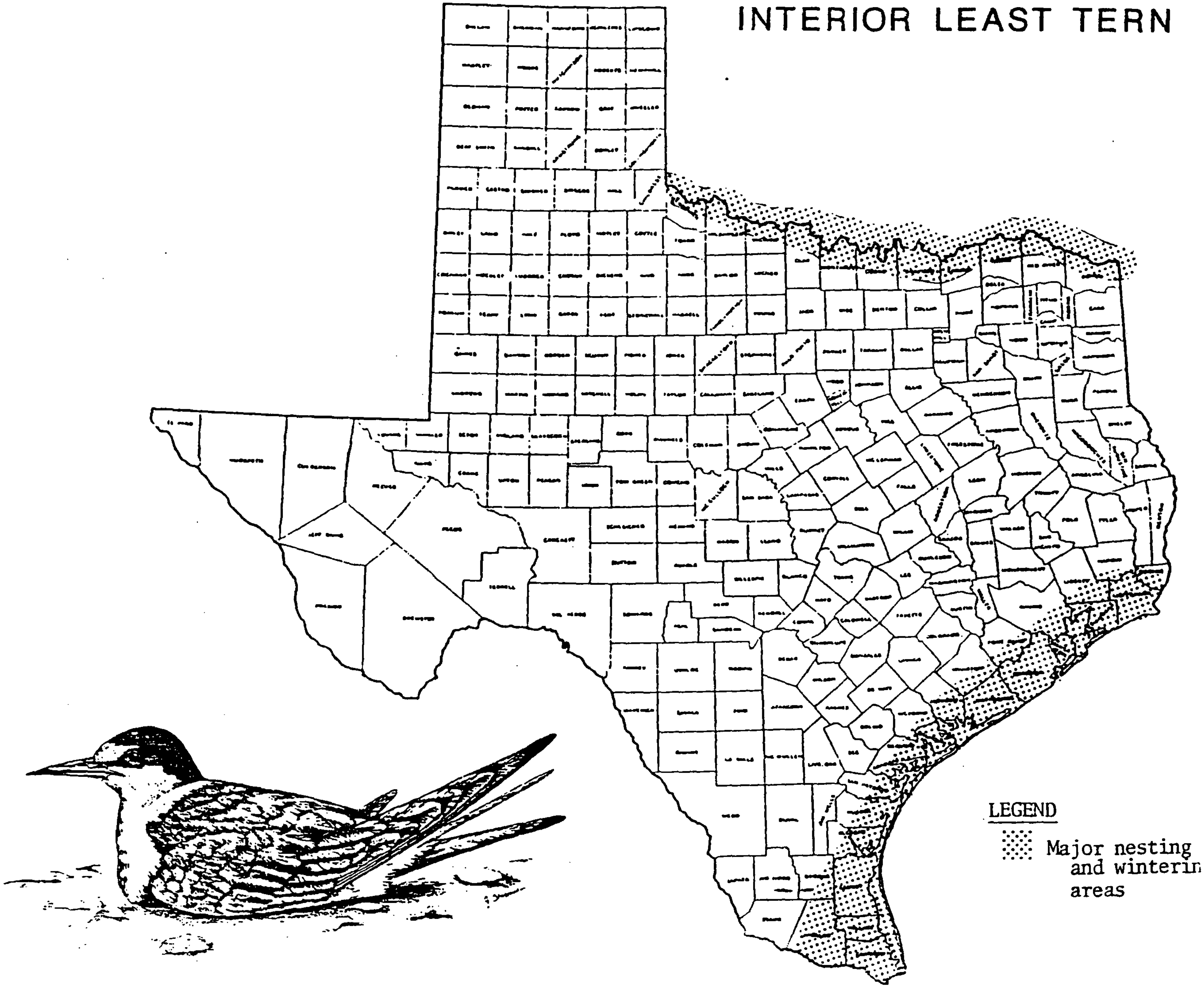
Present: Terns presently occur as small remnant colonies within their historic distribution.

REASONS FOR DECLINE: Many nesting areas have been permanently inundated or destroyed by reservoirs and channelization projects. Alteration of natural river or lake dynamics has caused unfavorable vegetational succession on many remaining islands, curtailing their use as nesting sites by terns. Recreational use of sandbars is a major threat to the tern's reproductive success. Release of reservoir water and annual spring floods often inundate nests.

OTHER INFORMATION: Recovery plan drafted in 1986. The Service is working with the States of New Mexico, Texas, Oklahoma, and the Bureau of Reclamation to monitor tern populations.

REFERENCES: Downing 1980, Ducey 1981, Faanes 1983, USFWS 1986a.

INTERIOR LEAST TERN

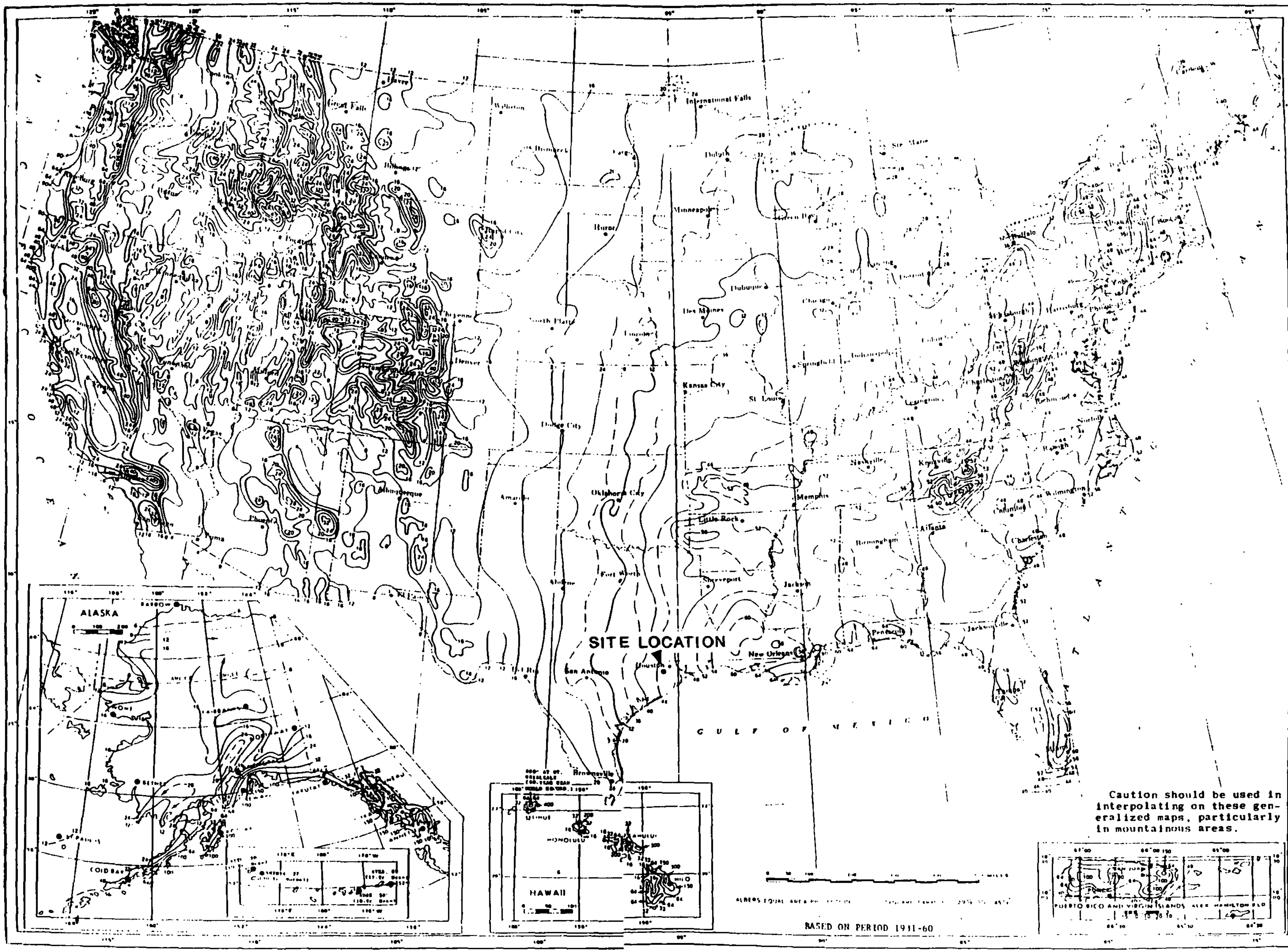


Reference 32

CLIMATIC ATLAS OF THE UNITED STATES

U.S. DEPARTMENT OF COMMERCE · Environmental Science Services Administration · Environmental Data Service

NORMAL ANNUAL TOTAL PRECIPITATION (Inches)



NORMAL ANNUAL TOTAL PRECIPITATION (Inches)